DECEMBER, 1960

TRAFFIC ENGINEERING

- Driver Requirements in Freeway Entrance Ramp Design
- Symbology on the Highways of the World
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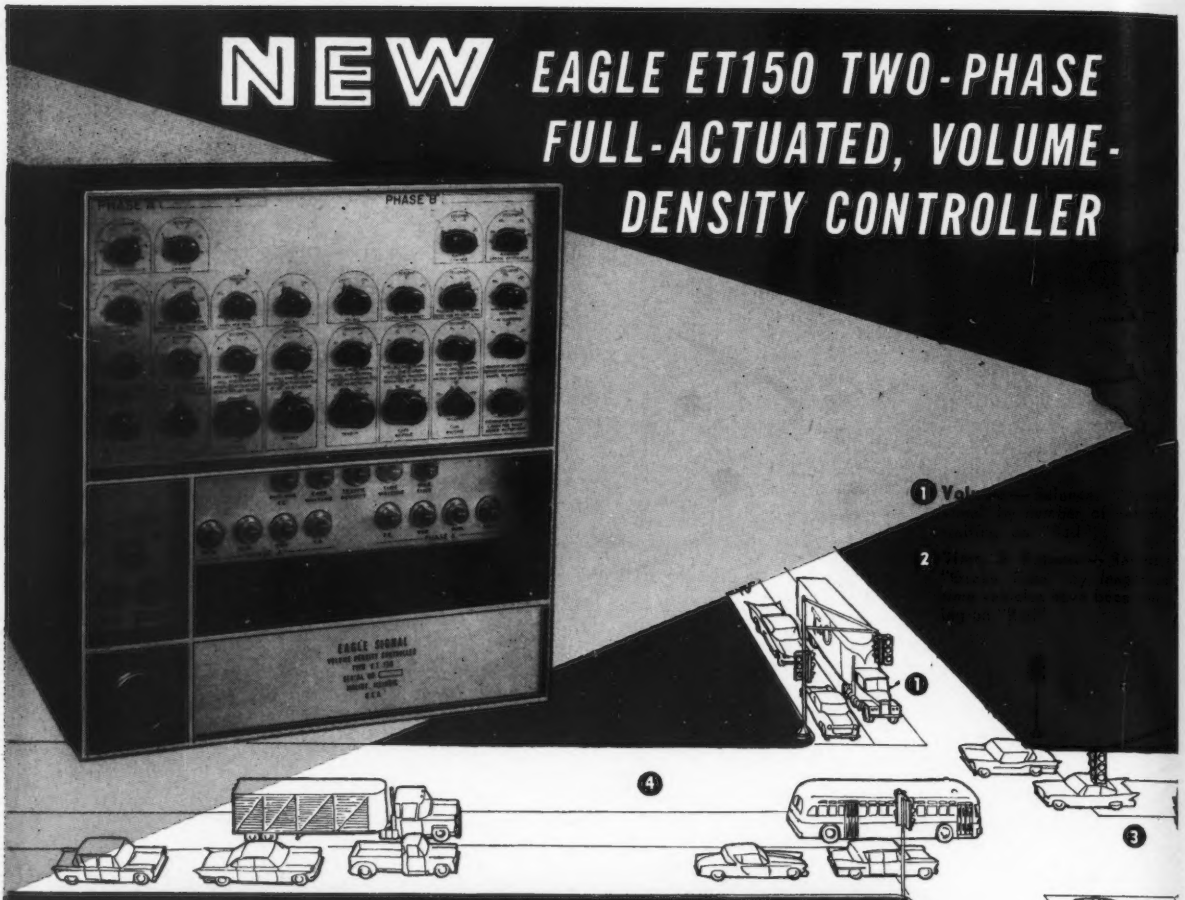

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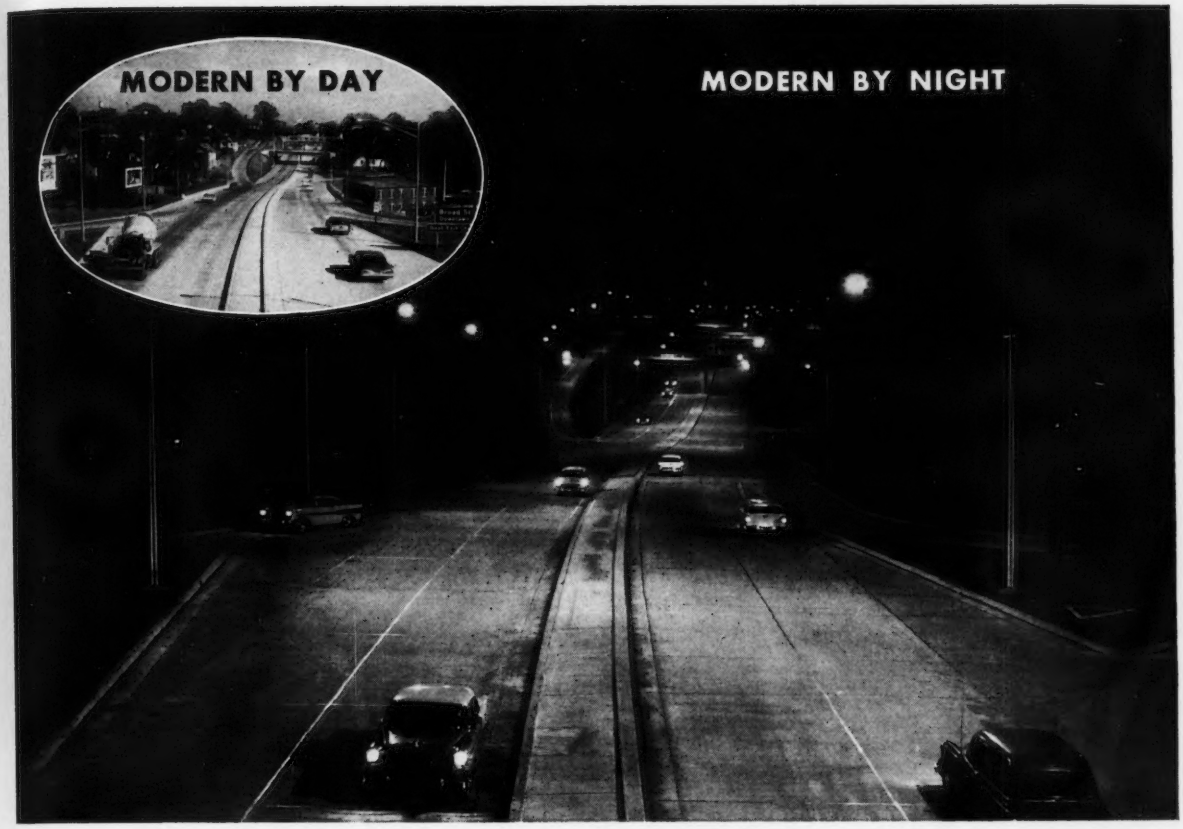

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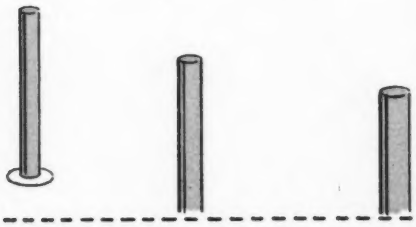

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Cover: The Greenbrae Interchange, at U. S. 101 and California Route 17 in Marin County, about five miles north of the Golden Gate Bridge, feeds traffic toward the Bridge and also toward the Richmond-San Raphael Bridge. An average maintained illumination of 0.9 foot-candles is provided by the mercury vapor luminaires for safe seeing during dark hours. —Photo from General Electric Co.

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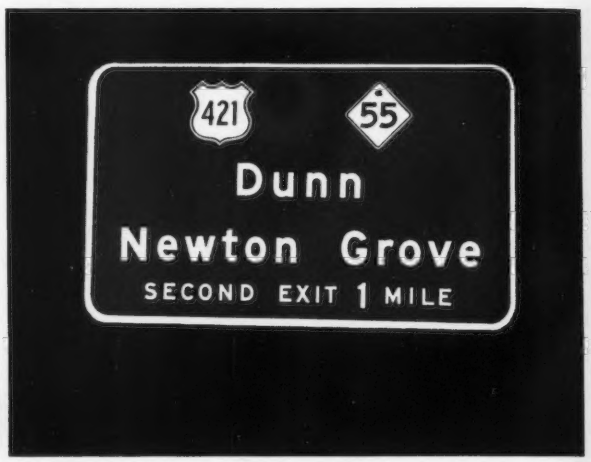

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Frankly Speaking . . .

THE REVISED MANUAL on Traffic Control Devices has been approved by all sponsoring agencies of the National Joint Committee on Uniform Traffic Control Devices. Final editing is underway, and the Manual is expected to be available for general distribution within the first few months of 1961.

This edition is the result of intensive work by members of the Committee, and others who contributed through sub-committee assignments. The Institute of Traffic Engineers has been well represented; in addition to its seven committee members, five of the AASHO members, and four of the representatives of the National Committee on Uniform Traffic Laws and Ordinances are members of the Institute. This means that 16 of the 22 committee members are ITE members. It seems safe to say, therefore, that no previous edition of the Manual has contained more traffic engineering thinking and experience than the edition now in publication. In an effort to gain as much breadth of thinking as possible, the sub-committee chairmen sought the assistance of traffic engineers who were not members of the Committee, but who have had rich and impressive experience in particular areas of traffic control.

The development of the new edition of the Manual was not a simple task. There are many very honest differences of professional opinion; local practices and precedents exert strong influences; almost every proposed change is met by strong counter-proposals, if not by complete opposition; time is short and needs are great; except for financing and staff assistance by the Bureau of Public Roads, most of the work involves extra activity, voluntarily contributed; improvements in products and basic materials for traffic control devices are frequently unproven; and higher standards of road design create new motoring practices which in turn demand new traffic controls. Actually, there were many changes in the Manual on which there was full unanimity of Committee decision, but others were debated at great length before approval. In any major policy-making endeavor, complete agreement is difficult to attain.

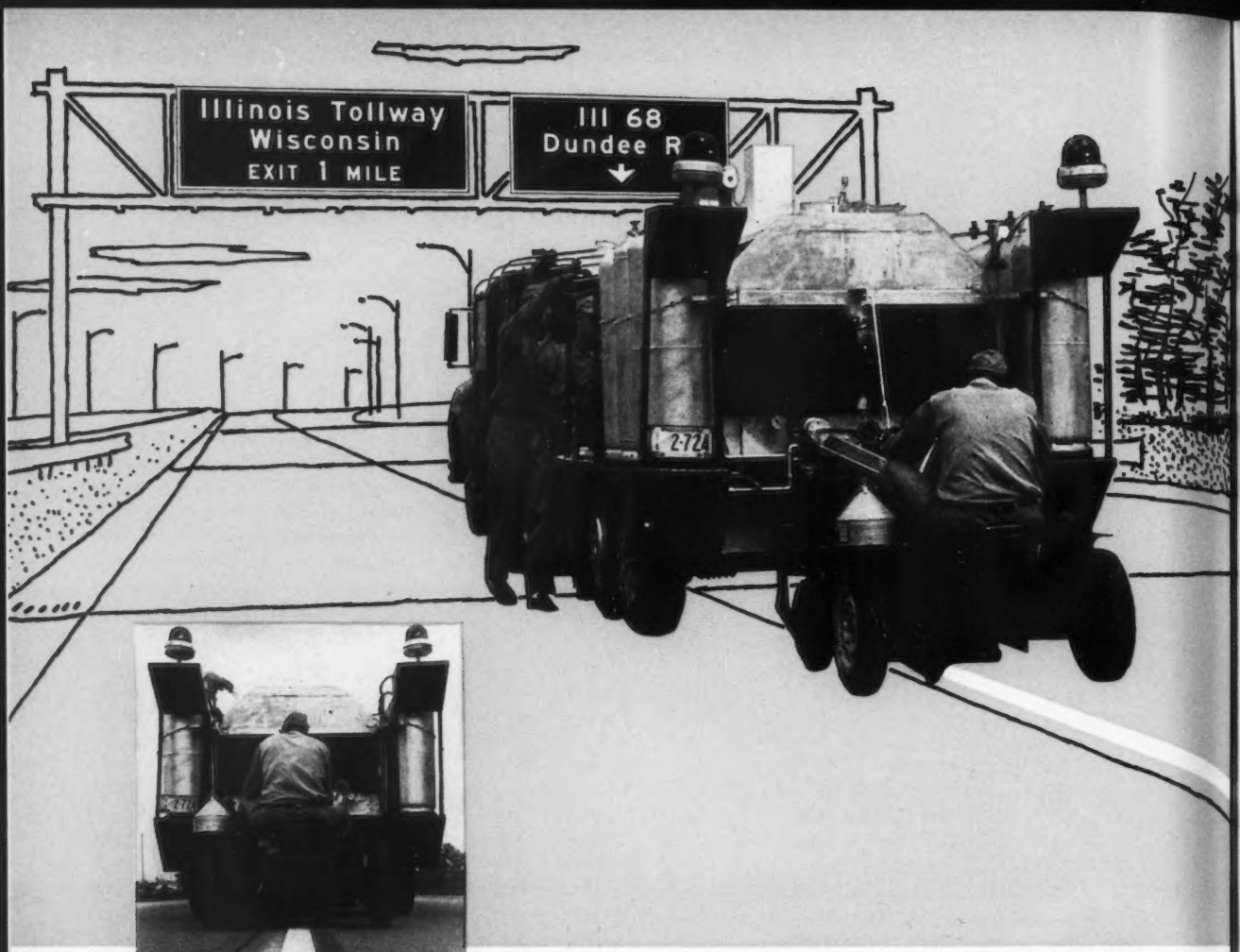
Suggestions obtained from the Institute membership and elsewhere were submitted to the Committee in its deliberations and full attention was given to each. Sometimes the proposals were adopted, sometimes not. Since the completion of the revised Manual, a number of criticisms have been heard; specific points have been singled out by members of the Institute and others for severe criticism. This is perhaps a very normal reaction. Some of these recent suggestions have been submitted to members of the National Committee and to other traffic engineers, and it is clear that on some matters wide differences of opinion prevail among "authorities," wherever they are found.

During the preparation of the Manual, certain questions were posed for which there were no bases for objective decision, and hence no change was made. These matters were referred to the research sub-committee for more intensive study so that the best devices and procedures can later be prescribed. Obviously, other points on which agreement was reached must be investigated further. Much research should be undertaken to evaluate still other revisions, but it would not have been proper to defer publication of another edition of the Manual for several years on this account.

All traffic engineers and other public officials must now "bury the hatchet" and accept the standards prescribed in the new Manual. Some are naturally disappointed that their views did not prevail but we must look at the result in a democratic manner and accept the will of the majority and more. Every member of the Institute can work through the Institute delegation for future improvement and change, and this is as it should be. Now, it is sincerely hoped that all will give their immediate support to achievement of uniformity and strive to conform to the recommendations which are intended to bring traffic control to a high level of national uniformity.

Wherever the National Joint Committee may have erred, the quicker this can be determined, and changes made, the better. Equally, if individuals who have found fault and have differed with the Committee are wrong, then they might as well admit this also as soon as possible. In many cases, only time will tell who was right—and in the meantime, unanimous and joint action is needed to make the purposes and contents of the Manual an effective force for better highway transportation.

WILBUR S. SMITH, *Past President*
Institute of Traffic Engineers



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Driver Requirements in Freeway Entrance Ramp Design

By Charles Pinnell
Assistant Research Engineer
Texas Transportation Institute
Texas A & M College

FREEWAY DESIGN and operation is still a relatively new phase of highway and traffic engineering and existing freeway systems have only recently experienced traffic volumes that permit a full evaluation of their operational efficiency. The designers of many existing freeways were faced with the difficult problem of designing a facility whose concept was entirely new with little or no operational data from which to guide the design. In the absence of operational data, the freeway designer was forced to use primarily vehicle performance data (size, speed, acceleration, etc.), topographical requirements and economy as a basis for design. In most cases this resulted in a lack of attention to the human aspect relating driver requirements and traffic behavior to design.

Safe and efficient entry maneuvers *can* be made on most of the entrance ramps in use today, but many were not designed so that the desired maneuvers are natural and easy and *will* automatically be performed by the individual drivers.

Freeway designers must become more concerned with the relationship of design and traffic behavior in order to obtain maximum operational efficiency on freeway facilities. This paper discusses operational characteristics of freeway ramp traffic and presents the essential elements in correlating ramp design with driver requirements.

Entrance Ramp Studies

The material to be presented is based upon the results of numerous freeway ramp studies conducted on freeways in Texas. Most of the data were obtained by motion picture studies in which traffic operations at ramp study locations were recorded on film by use of a 16mm motion picture camera. The filming was done from a vantage point approximately 60 feet above the traffic stream that was provided by a portable tower. The movies were made at a camera speed of 10 frames per second which allowed determination of vehicle speeds, delays, headways and other traffic characteristics and also permitted the reproduction of traffic operation at near actual speed for detailed studies of operation.

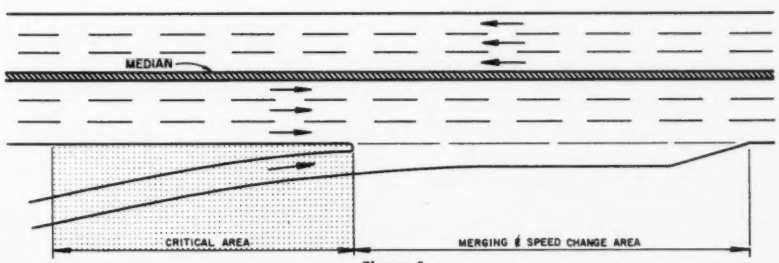


Figure 1
Critical Area Ramp Design

Eleven separate ramp studies were conducted on freeways in the cities of Dallas, Fort Worth, San Antonio and Houston, Texas. The study locations were specifically selected to provide data on various type entrance ramps operating under different volume conditions.

Factors in Entrance Ramp Design

The studies of freeway entrance ramp operation produced much valuable information and resulted in the development of some new concepts of entrance ramp problems and operation. The operational problems observed on most of the entrance ramps were the result of a lack of consideration for traffic behavior and driver requirements in the initial design of the ramp. These operational problems can be serious as entrance ramps are critical elements of freeway systems and the operation of the entrance ramp can have tremendous effect upon the operational efficiency of the entire freeway system. Therefore, it is essential that freeway entrance ramps be designed to obtain a maximum of operational efficiency.

Entering a high-volume and high-speed freeway is one of the most difficult maneuvers required of freeway drivers. The entering driver must approach the freeway, evaluate the traffic stream on the main freeway lanes and select a suitable gap into which he can maneuver his vehicle. He must then adjust the speed of his vehicle and make an entry maneuver while giving due consideration to other vehicles on the ramp and main freeway (both ahead and behind) that may influence his maneuver. Thus a freeway entry is a very complex maneuver requiring numerous and rapid driver decisions and the driver should be given every assistance possible in making this entry maneuver by incorporating his requirements into the design of the entrance ramp.

Most previous entrance ramp studies and discussions have considered the design of acceleration lanes. However, it was found in these studies that the most critical area in entrance ramp design is the area traversed by the entering ramp vehicle before reaching the ramp nose. In this area (Figure 1), the driver makes decisions regarding his freeway entry and the design of this area has marked influence on the entry maneuver made by an entering driver.

Proper design of this critical area is essential to establishing the necessary correlation between design and operation and in providing necessary driver requirements. Results of the entrance ramp studies indicated the following factors are vital functional elements of good entrance ramp design and essential to the provision of necessary driver requirements:

1. *Angle of Entry*—formed by the intersection of entrance ramp approach and freeway lanes.

2. *Visibility Relationship*—between ramp traffic and freeway traffic.

3. *Delineation*—ramp nose and acceleration lane.

Each of these factors are related to the requirements of entering ramp drivers and when properly considered in the design of an entrance ramp they will enable ramp traffic to enter the freeway with a minimum of effort and with maximum safety and efficiency.

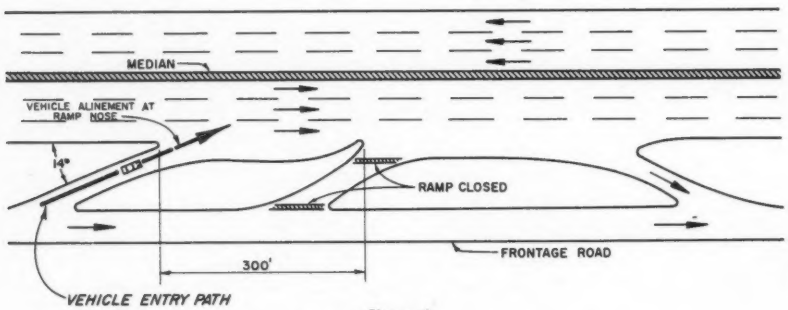


Figure 2
Cullen On-Ramp, Gulf Freeway—Houston

Figure 3
Direct Type Vehicle Entry

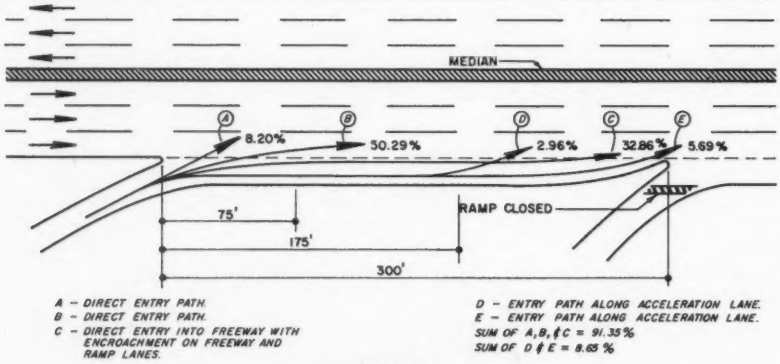


Figure 4
Paths of Entry, Short Acceleration Lane

Angle of Entry

The initial ramp studies were conducted on the Gulf Freeway in Houston, Texas, at a location where the entrance ramps had an angle of entry (angle between main freeway lanes and entrance ramp) of approximately 14° as shown in Figure 2. This high angle of entry tended to aim the entering drivers along a direct-type entry path into the main freeway lanes as illustrated in Figure 3.

A study of vehicle entry paths at this location indicated the ramp usage pictured in Figure 4. As can be seen, a relatively small per cent (8.65) of the drivers fully utilized the acceleration lane which was 300 feet in length. The predominant direct-type entry results in the creation of a high relative speed between entering ramp traffic and main freeway traffic, which develops undesirable friction in the freeway traffic stream. During peak periods this results in inefficient and hazardous operation and sometimes complete breakdown of freeway operation.

Modifications were made in the ramp design (Figure 5) to allow the extension of the acceleration lane to approximately 1,000 feet in length. This was done in order to determine if an increase in the length of the acceleration lane would improve acceleration lane usage and ramp operation. The entry paths on this type ramp are shown in Figure 6. The direct, high relative speed type of entry was reduced by 21.1% but was still being made by 70.18% of the entering ramp drivers.

Operational studies were also conducted on entrance ramps with a smaller angle of entry and on ramps which had been modified with paint lines to align drivers along the acceleration lane. These studies indicated an increased use of the acceleration lane and smoother merging of ramp and freeway traffic. A typical entry of this type is shown in Figure 7.

Thus it was indicated that the angle of ramp approach is the primary influence on the entry path followed by an entering driver. If desired usage of the acceleration lane is to be obtained it is necessary to align the driver along the acceleration lane by providing a flat-angle approach as indicated in Figure 8.

Visibility Relationship

The visibility of freeway lanes and freeway traffic provided entering ramp traffic is one of the most essential requirements of ramp drivers. Studies of traffic behavior on entrance ramp approaches where good visibility was available indicated that drivers begin their evaluation of the freeway traffic stream as far as 200 feet before reaching the ramp nose. If suitable gaps are available in the traffic stream, a decision regarding freeway entry can often be made well in advance of the entrance ramp nose.

This changes somewhat the concept of how ramp traffic enters a freeway. Instead of arriving at the nose at a slow speed and then accelerating along an acceleration lane, the most desirable entry maneuver is made by the driver who approaches the ramp nose at a fairly high rate of speed. This driver selects a gap in the freeway traffic stream before reaching the ramp nose, adjusts his speed on the acceleration lane or "speed-adjustment lane" and performs a smooth lane-change maneuver into the freeway. If the driver is unable to observe the freeway in the proper perspective before reaching the ramp nose then it is usually necessary for him to stop and be delayed while selecting a freeway gap.

Figure 9 shows a sequence of telephoto shots of a driver as he enters a freeway. This driver has reduced the speed of his vehicle to a slow crawl at the ramp nose and is making his freeway gap evaluation at this location. From this point the driver must look back over his shoulder (a very uncomfortable maneuver) to judge freeway gaps and a very high relative speed (25 to 35 mph) exists between his vehicle and the main freeway traffic. This type of freeway entry is very difficult and often hazardous.

Figure 10 shows the behavior of another driver entering a freeway that has selected a gap before reaching the ramp nose. This driver moves into the freeway with a low relative speed (5

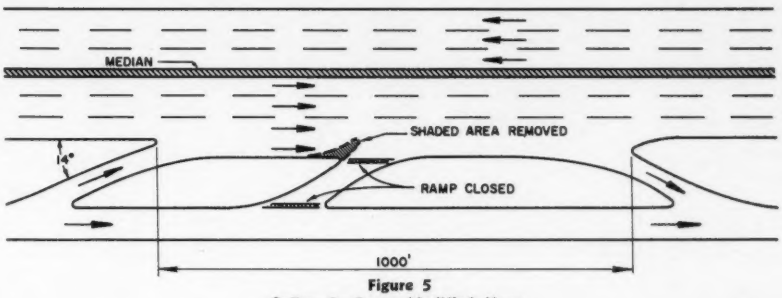


Figure 5
Cullen On-Ramp Modified Nose

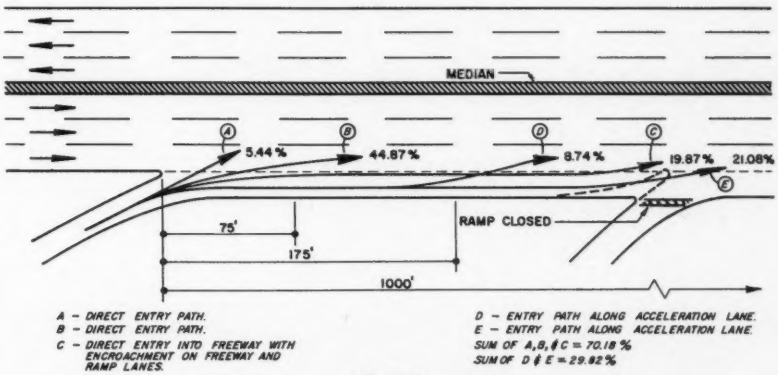
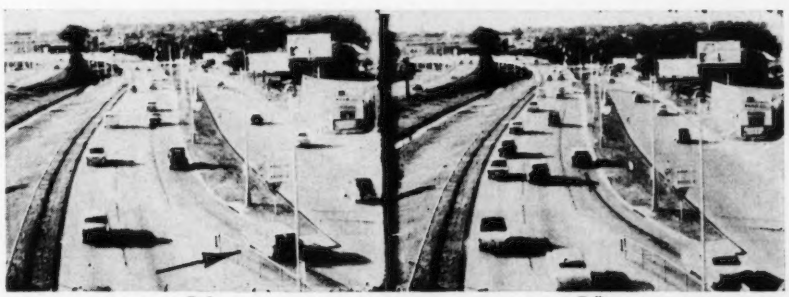


Figure 6
Paths of Entry, Long Acceleration Lane



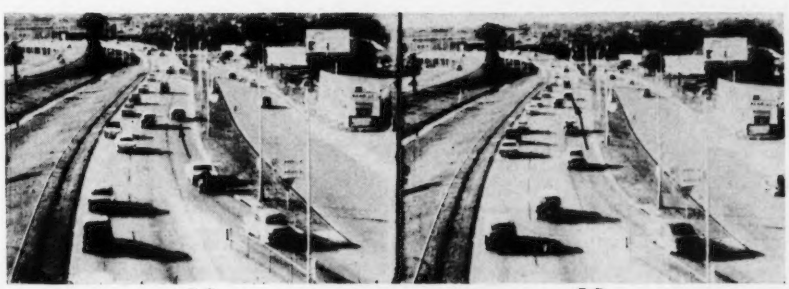


Figure 7
Desirable Vehicle Entry

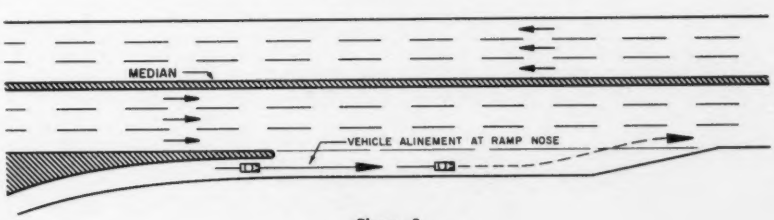
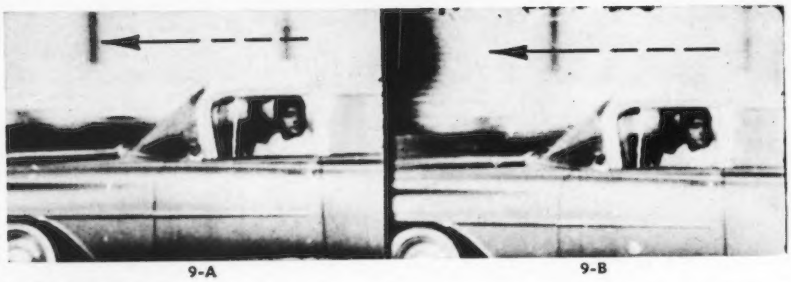


Figure 8
Flat Angle Approach



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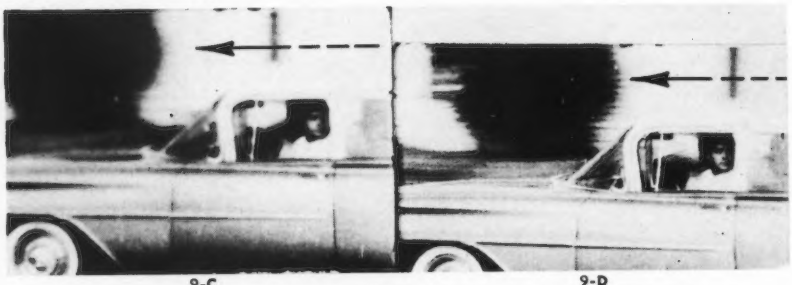


9-C 9-D

Figure 9
Behavior of Driver Entering Freeway from Ramp with High Relative Speed

10-A 10-B

10-C 10-D

Figure 10
Behavior of Driver Entering Freeway from Ramp with Low Relative Speed

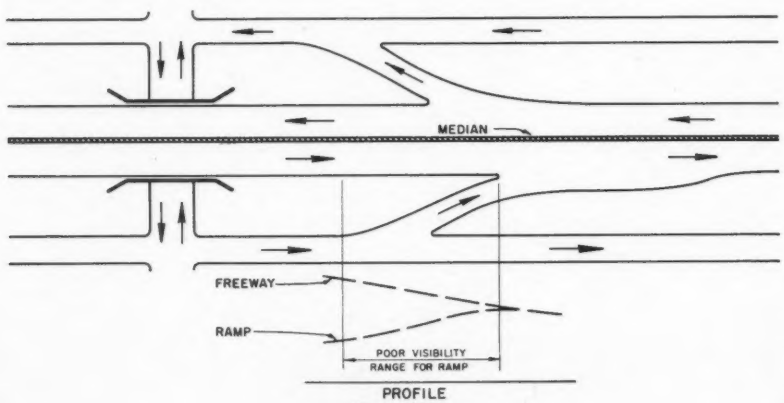


Figure 11
Diamond Interchange

to 10 mph) and with a minimum of driver effort. His entry is simply a "lane-change maneuver" and has little or no disturbing effect on the main freeway traffic.

Many existing freeway ramps do not provide this essential requirement of good visibility to the entering ramp driver. A typical problem which can develop is shown by the diamond interchange design in Figure 11. In this case the freeway is carried over the city street and an entrance ramp is introduced just past the overhead structure. As indicated by the grade profile (Figure 11) and the snapshot in Figure 12A, a very bad sight restriction exists. It is impossible for the driver on this ramp to evaluate freeway traffic before reaching the ramp nose. As a result a majority of the ramp traffic is forced to stop at the ramp nose and enter the freeway with a high relative speed.

Careful consideration in design must be given to providing adequate visibility such as is indicated in Figure 12B. Freeway entrance ramp grades (either ascending or descending) should be made to match that of the freeway a minimum of 200 feet in advance of the nose (Figure 13). This provides entering ramp traffic with adequate visibility and permits the drivers to begin evaluation and selection of freeway gaps before reaching the ramp nose.

Delineation

A third vital requirement of entrance ramp drivers is adequate delineation of the ramp nose and acceleration lane. Although increased use of freeways has resulted in a larger percentage of drivers educated to the use of their various elements, there are still many drivers who do not fully understand the proper method of entering a freeway. Also, there are many different types of entrance ramps (without acceleration lanes, with short acceleration lanes, long acceleration lanes, and with additional freeway lane at ramp) being utilized and the ramp drivers often do not know that the acceleration lane is exclusively for their use. This often results in very inefficient operation with the traffic stopping at the entrance ramp nose.

It is essential to inform the drivers of what is provided for their use in entering the freeway. Good delineation in the form of color contrast, paint striping and/or other methods should be provided to enable the drivers to

distinguish adequately between main freeway lanes and the portion of the entrance ramp specifically designed for their use. This would eliminate much driver indecision and greatly facilitate safe and efficient ramp operation.

Entrance Ramp Accidents

Studies of accidents on freeway facilities in Texas with special emphasis on correlating accidents with design elements have indicated that entrance ramps often experience a high accident frequency. A high accident pattern on an entrance ramp is shown in Figure 14. The predominant accident type is the rear-end collision and the ramp design provides a high angle of entry, poor visibility and poor delineation.

During the various study periods five ramp accidents occurred and were recorded on film. A typical entrance ramp accident is illustrated in Figure 15. Here, as in the case of most entrance ramp accidents, the accident resulted from a false start by the leading vehicle and a collision by the trailing vehicle. The driver of a trailing vehicle on an entrance ramp is put in the unfortunate position of needing to look in two directions at the same time. He must accept a gap in the freeway traffic stream and also keep an eye on the vehicle ahead. The trailing driver often assumes that the lead vehicle is going into the freeway and looks back while his vehicle is moving forward. If the lead vehicle stops, a rear-end collision often results.

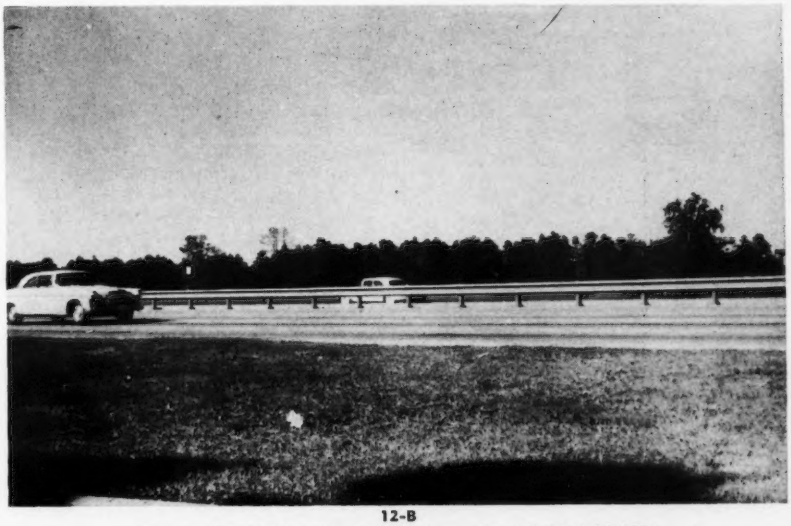
The basic cause of this accident, however, is related to the fact that many of the vehicles are required to make an abrupt stop at the ramp nose. The cause of this stop is related to a lack of design consideration for the previously discussed factors of approach angle, visibility, and delineation. If the drivers were properly aligned along the acceleration lane, provided adequate visibility and were sure of the purpose of the acceleration lane a majority would move into the freeway in a continuous movement. Even if a gap were not available in the freeway stream there would be no need for an abrupt stop.

Thus the inclusion of the proper design elements and driver requirements will serve not only to produce a smoother merge of the ramp and freeway traffic but should also aid in reducing the accident problem that exists on many entrance ramps.

Ramp Approach Width

Several studies were conducted on entrance ramps with wide approaches such as the one shown in Figure 16. The approach width on this ramp was designed to allow one lane for traffic movement and sufficient width to pass disabled vehicles. This design, however, illustrates a lack of consideration for traffic behavior. Rather than use

12-A
Entering Drivers' View from Ramp Approach with Poor Visibility



12-B
Entering Drivers' View from Ramp Approach with Good Visibility

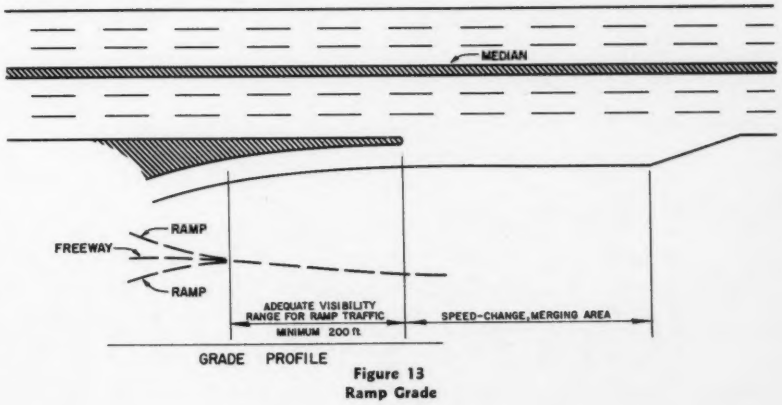


Figure 13
Ramp Grade

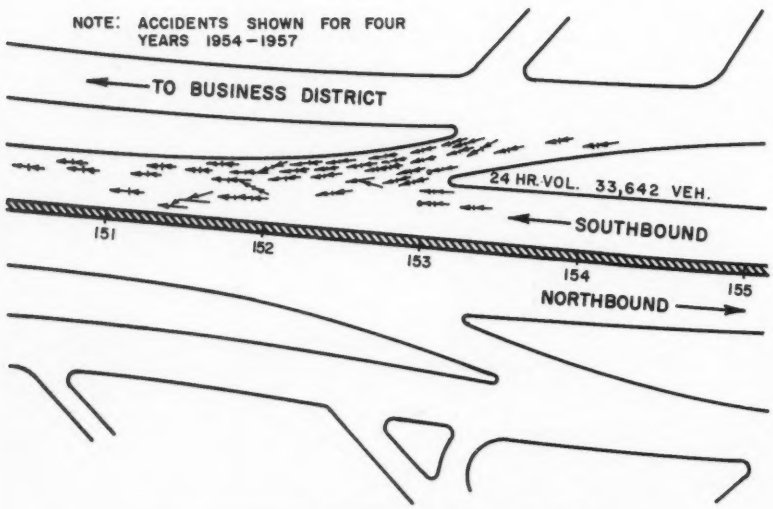
the ramp for one lane operation as intended, when peak loads occur, traffic on the ramp will use the facility as a two-lane ramp. In all cases, this resulted in unsatisfactory operation.

Since only one vehicle at a time can utilize the acceleration lane, the two lanes of approaching ramp traffic must merge into single file at the ramp nose, or else, the vehicle in the left lane of the ramp is forced to make a direct entry into the freeway without the benefit of an acceleration lane. A typical illustration of this operation is shown in Figure 17. In this case, two-lane operation is occurring and the car in the inside lane is waiting to make a direct freeway entry. This car is blocking the visibility of the other ramp traffic and creates a hazardous situation as traffic behind this car attempts to change lanes in order to reduce their delay.

This ramp was later modified so that only single-lane operation was permitted. "After" studies at this location indicated much smoother ramp operation and an increase in ramp capacity due to the elimination of the situation shown in Figure 17.

This led to the conclusion that the approach section of an entrance ramp should be designed to accommodate only one lane of traffic. A mountable curb and paved shoulder should be provided on the right to allow disabled vehicles to leave the traffic stream.

CENTRAL EXPRESSWAY—DALLAS, TEXAS
ON-RAMP AT CALVARY



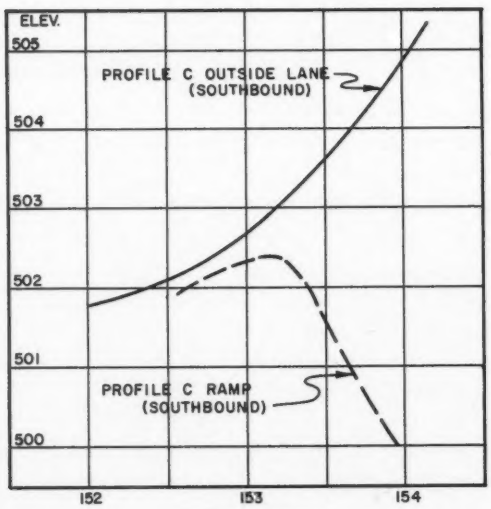


Figure 14

Desirable Entrance Ramp Design

Figure 18 illustrates an entrance ramp design incorporating all of the features previously discussed. This design provides the necessary correlation between traffic behavior and design to provide the necessary driver requirements.

The length and design of the acceleration lane indicated is perhaps subject to question. Research is continuing in this area but data available at present indicate that the design shown in Figure 18 would operate very satisfactorily. With a low approach angle and proper visibility provided, higher entry speeds can be obtained and the acceleration lane becomes more of a "speed-adjustment lane."

Another point which should also be considered is the operation of entrance ramps during periods of peak traffic movement. It has been observed during the course of the ramp studies, that there are periods of short duration (10 to 15 minutes) during which the main freeway traffic volumes are of such magnitude that satisfactory entrance ramp operation is impossible to obtain. This is simply a case of traffic demand exceeding capacity and no improvement in ramp design will solve the problem.

There is, however, in the case of most freeway facilities approximately 23 hours a day during which the entrance ramps and adjacent freeway sections are operating below possible capacity. It is during this period that the entrance ramps should be operating with a maximum of safety and efficiency.

Summary

Relating the design of freeway entrance ramps to traffic behavior as indicated by the requirements and desires of the driver is a necessity if maximum efficiency and safety in ramp and freeway operation is to be obtained.

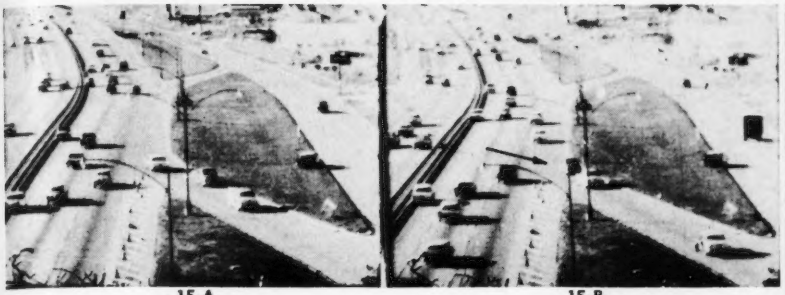
Entrance ramp design should provide the following:

1. A flat angle ramp approach which aligns the driver along an easy and natural path into the freeway.

2. Adequate visibility to allow the entrance ramp driver to judge and accept a freeway gap with a minimum of effort.

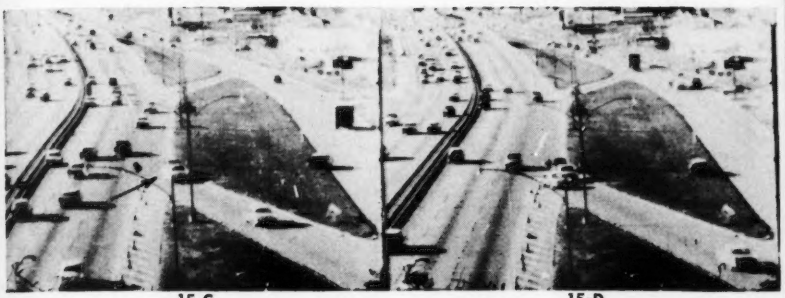
3. A clearly marked and delineated entrance ramp which would eliminate any confusion in distinguishing be-

(Continued on page 54)



15-A
Approach

15-B
False Start



15-C
Collision

15-D

Figure 15
Ramp Accident

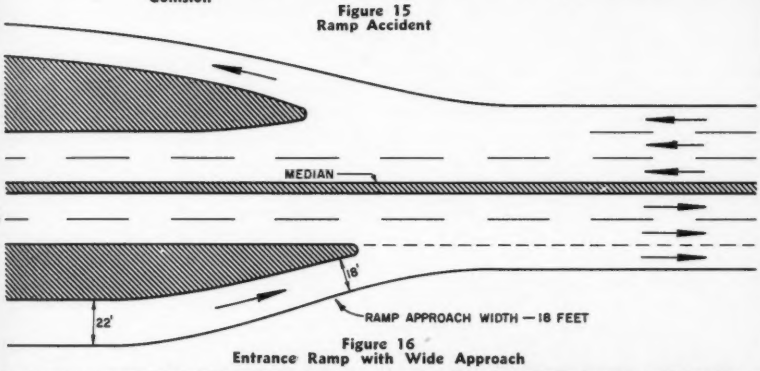
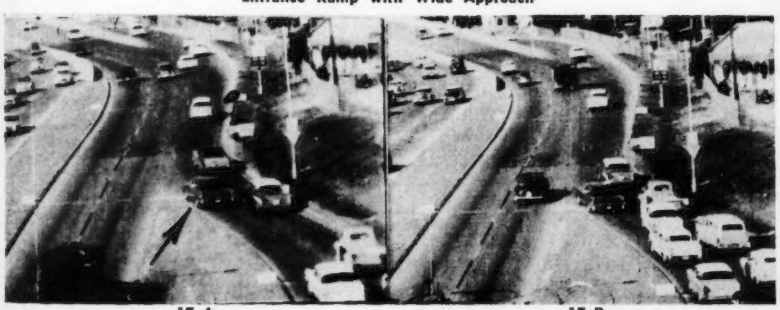
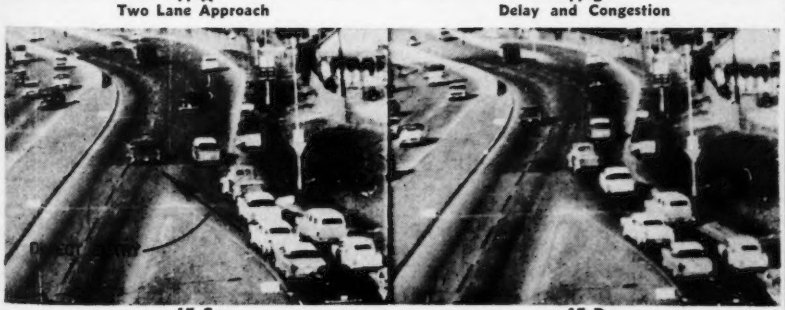


Figure 16
Entrance Ramp with Wide Approach



17-A
Two Lane Approach

17-B
Delay and Congestion



17-C
Direct Entry

17-D

Figure 17
Two Lane Ramp Operation

the perfect combination

M-35 SVAP

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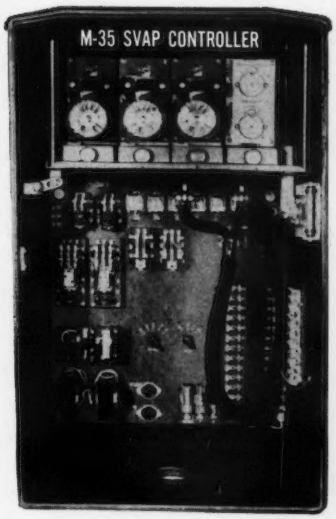

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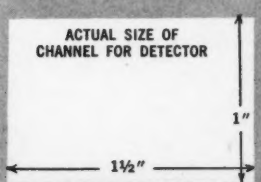

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Symbology on the Highways Of the World

By William G. Eliot, 3d
Supervising Highway Research Engineer
U. S. Bureau of Public Roads

SYMBOLISM ON OUR HIGHWAYS, like symbolism in many other areas of human communication, has its beginnings in primitive civilizations. Perhaps the original "No Entry" sign was the flaming sword set up on the one-way road out of the Garden of Eden—a most effective symbol for those who know only too well what it meant. Indians and pioneer woodsmen have marked their trails with broken twigs. Mysterious rock carvings in our Southwestern States may have been for the guidance of passing strangers. Explorers have erected stone cairns along their paths, and at the uttermost points of their advance. More formal and substantial stone mileposts are said to have distinguished the famous roads of Rome. It is a long way, by road, from these simple devices to the elaborate controls of the present day.

The ancient highways needed few signs, as we now think of signs. Hazards were so obvious as to call for no special identification. There were few regulations, if any, to be posted for the control of traffic. Even directional signs were scarce. The traveler had little choice of routes, at best. When faced with a choice, he had plenty of time to make his decision, and if he was wise he had sought and obtained his road information in advance. In towns and cities the symbolic signs of inn-keepers and other tradesmen often provided helpful landmarks.

Without the motor vehicle, highway signs might well have remained primitive, local, and highly individualistic. The motor vehicle that tremendously expanded the range of travel and brought an era of individual travel for the masses also created new hazards and a need for vastly improved guidance for the strangers who were following new highways into distant places. The modern age of standardization and uniformity in traffic signs, to the extent that such standardization and uniformity have been achieved, is the natural and inevitable consequence of motor transport.

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Among the earliest symbolic road signs was the "fingerboard," defined in some dictionaries as "a guide-board bearing a pointing finger" (Figure 1). The symbolic finger, whether painted or carved, seems to have evolved over the years into a plain beveling or sharpening of one end of the board (Figure 2).

On present-day highways the arrow symbol has taken over the role of the pointing finger. Just when an arrow was first used to mark a direction has not been recorded. Yet the arrow, now highly conventionalized, is one of the commonest graphic symbols on high-

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This paper was presented by Mr. Eliot at the Fourth Communications Conference, sponsored by the Art Directors Club of New York. It is reprinted here with permission of the sponsor and of Hastings House, publisher of the book: SYMBOLOGY—The Use of Symbols in Visual Communications.

way signs. In conjunction with a geographical name it indicates the way toward a destination (Figure 3). In a danger sign it suggests the course or alinement of the roadway ahead (Figure 4). In a regulatory sign it conveys a mandate to proceed in a certain direction (Figure 5). In each of these applications, note that the arrow as a symbol is not complete in itself. In every instance it must be accompanied by an inscription or by some other symbolization, perhaps only of sign shape or color.

This illustrates an important element in the design of symbols. Symbolization in highway signs is basically of two kinds, that which may be called pictorial and that which is abstract or purely conventional, though there is no clear line of distinction between the two. In the pictorial category are those graphic symbols that can be expected, in themselves, to convey some meaning to an intelligent person. They illustrate some object or feature in the roadway and traffic complex, or, by implying a directional motion, suggest a course of action, either optional or mandatory. Abstract symbolization, on the other hand, depends on a more or less arbitrary code of meanings, artificially created and accepted as a matter of convenience.

Actually there are very few symbols, if any, that can express complete messages without association with other symbols, inscriptions, or previous experience on the part of the observer. The arrow is a generally clear pictorial symbol, yet, as we have just seen, it can mean a number of different things, depending on other features of the sign on which it appears.

Intersection diagrams, or "maps," are also to be classed as pictorial. These include various designs that indicate the general layout of the roadways at an intersection, either as an advance warning of danger (Figure 6), or as a guide to a choice of routes (Figure 7). Here again the meaning to be read depends on whether the symbol appears on a warning sign or on a guide sign, as these signs are recognized and distinguished by the users of the highways.

Observe that the course to be traveled immediately ahead is shown vertically up from the bottom of the sign. This seems to be universal practice. Other maps conventionally show north at the top, but these highway signs are

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interpreted as if the landscape ahead were tipped up toward the driver for his inspection. It is interesting to compare these signs with those (also pictorial) showing the profile of the roadway ahead, which are normally read horizontally from left to right (Figure 8).

Then there are the real pictures—not always works of art! — that portray familiar objects in such a manner as to suggest specific hazards, or to indicate objects toward which attention is to be directed. We have few such symbols in this country, but they are common in Europe, where symbolization, by necessity, goes far beyond ours. A good example is the silhouette sketch of a locomotive at a railroad grade crossing (Figure 9), or that of an absent-minded pedestrian in the roadway (Figure 10). There are also figures illustrating classes of vehicles that are excluded from, or assigned to, certain roadways. But even such clearly identifiable figures cannot stand alone. From the railroad locomotive symbol one might conclude that there is a railroad station nearby, just as the sketch of an old style (and somewhat anthropomorphic) gasoline pump (Figure 11) on another kind of sign indicates the availability of motor fuel. The outline of a bicycle marks a route closed to cyclists (Figure 12), but with a few changes of color, it also designates a special, compulsory, cycle path (Figure 13). The correct meaning of any picture is derived in part from additional symbolism on the sign or from a conventional interpretation to which road users have become conditioned by experience.

With these limitations on pictures we must resort extensively to abstract or conventional symbolization. This covers such features as sign shape or color, and arbitrary meanings attached to any symbol. It depends on artificial associations of ideas, created for special purposes. There does not, for ex-

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ample, appear to be anything about a diamond-shaped sign, or a yellow sign, or, in Europe, a triangular sign that in itself suggests danger. If we are alerted to caution by these elements in signs, it is solely because we have learned by experience or indoctrination to recognize certain shapes and colors as belonging to warning signs.

Perhaps there is some good psychological reason for associating the color red with danger, or, specifically, with a mandate to stop. At any rate, traffic signals throughout the world bring vehicles to a halt when they show red. Green and yellow also have recognized meanings in our traffic signals. This coding of colors probably derives from earlier marine and railroad practice, but the symbolism is none the less artificial. It is only certain sorts of red lights that stop us, of course. We are willing to follow indefinitely the red tail lamp on another automobile, and even to overtake and pass it. To be effective, a traffic signal must be conventional in other respects than color.

There may be something logical in the interpretation of a flashing or intermittent light as something less positive than a fixed light, or of a broken line as less restrictive than a continuous stripe along the highway in keeping vehicles in their assigned lanes of travel. A flashing red light, accordingly, is understood to permit proceeding *after* stopping, and a broken line is only a guide line that has no legally regulatory significance (Figure 14).

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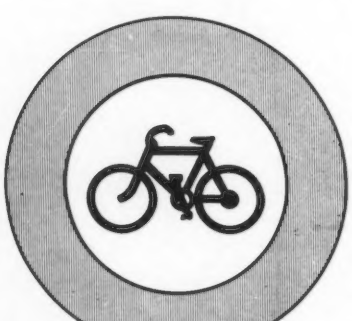
Because of these necessary associations of ideas, symbology on our highways is not a simple thing. It is possible, by mass indoctrination or conditioning, to make any symbol mean what we want it to. Conceivably, we could educate our American drivers to decipher all our signs from, say, Chinese characters—which, we are told, are basically pictorial. But the fundamental logic and objective of symbolism is to provide a language that can be universally recognized and understood. To be accepted it must not seem to be something foreign, but rather something indigenous and familiar. If it also has taken root abroad, so much the better.

This introduces some very real difficulties. Pictorial symbols derive their meanings from our existing culture, which is not the same from one time to another or in all parts of the globe. The European design of the railroad-crossing symbol is a good example of an anachronism (Figure 9). Here is the silhouette of a steam locomotive of an early vintage. Each new generation of drivers can learn the significance of the strange device, but as a pictorial symbol it is fast becoming, to Americans, at least, as obsolete as a quill pen. Unfortunately the diesel locomotive is so lacking in distinctive character as to be almost useless as a modernized substitute symbol. Similarly, though perhaps not as dramatically, technological progress can be expected to require the modification or abandonment of other pictorial symbols, and the addition of new ones. How, for example, are we going to symbolize the emergency closing of a highway because of a radiation hazard?

There are geographical, as well as chronological, differences in culture. The European "Pedestrian Crossing" symbol (Figure 10), a silhouette of a brisk gentleman wearing a business suit and a felt hat, could appear quite outlandish in some parts of the world. Fortunately a more conventionalized human figure is relatively easily designed. Or the same pedestrian might, without losing his authority, adopt native dress wherever he appears. Highway signs might even gain something by speaking in a local dialect.

Closely akin to differences in national or local culture are differences in local connotations of or associations with particular symbols. During the deliberations of the United Nations Group of Experts on Road Signs and Signals a few years ago, in the search for a universally recognizable symbol for the "Stop" sign, the rather logical suggestion was made that the upraised hand of a policeman be shown (Figure 15). It seems, however that in Paris, among taxicab drivers, the same symbol, personally performed, conveys an insult somewhat equivalent to a thumbing of the nose. A "Stop" sign with such an implication might command slight respect in Paris, regardless of its effectiveness elsewhere.



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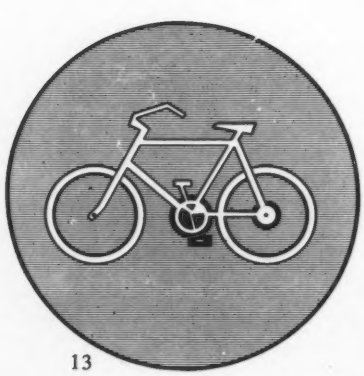

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The United Nations standard sign for a first-aid station shows a red cross for use in the western nations, but a red crescent for the Islamic countries. As long as emergency help is to be associated with either the Red Cross organization or its Eastern counterpart, a single symbol for worldwide use will not be wanted.

Then there are many messages that, for practical purposes at least, cannot be conveyed wholly by symbols. This is particularly true of special traffic regulations. Part-time parking regulations, for example, must show the limiting hours. Parking permitted on opposite sides of a street on alternate dates, as in some municipalities, would be rather difficult to express in pictures. Some sort of symbolization can, of course, be devised for even the most unusual regulatory requirements (Figure 16), but we cannot expect all

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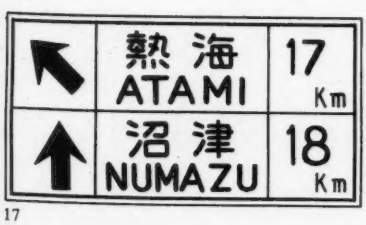
drivers to carry with them a memorized or printed code reference book.

Roadway hazards offer similar problems at times. How, for example, are we to indicate symbolically that there is a temporary foggy condition ahead that cuts visibility to near zero? Or what kind of diagram can we use at the entrance to a "dead-end street?" We simply have to use some word messages, and trust that our drivers are literate, in more than one language if necessary.

Finally, it must be noted that the names of destinations (Figure 3) must almost invariably be spelled out in alphabetical characters. Since a geographic name is usually much the



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same in all languages, we have little difficulty until we are compelled to use an unfamiliar alphabet or some sort of oriental characters. Bilingual signs are sometimes the only solution (Figure 17).

Apart from these underlying psychological problems, there are certain graphical and technical limitations in highway symbolization. To be useful for high-speed motor traffic, a highway sign must be recognizable from a long distance. This not only limits a symbolic design to one having a bold outline and a minimum of minor details, but requires that it be so distinctly different from other symbols in its over-all effect as not easily to be confused with any of them. The more complex the message to be conveyed, the more fine detail is required, and the poorer the legibility becomes. At the same time, the more pictures we attempt to use, the more likely we are to have general resemblances between the "ink-blot" patterns seen by speeding or myopic drivers.

Sign materials and fabrication can also influence symbolization. Each additional color used on a sign adds one step to the manufacturing process, and there are some production techniques adaptable only to two-color designs. The higher cost of more color may be relatively slight, but when multiplied by millions of individual signs it is not insignificant. A substantial portion of the standard signs in Europe are of three-color design. It goes without saying, however, that if and when it is demonstrated that three or more colors are necessary for effective signing we shall not let cost stand in the way of using them.

Availability of materials can affect sign design. Some color pigments for example, are not suited to the rigors of roadside weathering. It is said that the reason for standardizing a yellow "Stop" sign in this country during the 1920's, instead of a more conventional red, was that there was then no red paint that could successfully stand up under prolonged outdoor exposure. Durable reds have since been achieved, and for the past five years we have been replacing the yellow "Stop" signs by those conforming to a new red standard. Similarly, a satisfactory reflectorization of many pictorial symbols would have been impossible without the invention of sheet or area reflecting materials.

With this general background of practical problems in signing and symbolization we are now more ready to consider the practicability of worldwide uniformity in traffic-control devices. The arguments for a standardized sign language in a polyglot and illiterate world need not be repeated before this audience.

There is no natural, or supernatural, highway symbology that somewhere awaits only discovery and application. The only way we can avoid the difficulties inherent in a Babel of tongues is to create deliberately one more new and artificial language. Already there is a very considerable common vocabulary, a sort of "lingua Franca," born from a common need, but there are also many symbols familiar only in local areas, and a much greater number of inscribed messages, some of which, though by no means all, might find expression in acceptable symbolism.

Speaking broadly, there are two basic schemes of standardized traffic-control devices, referred to, for convenience and brevity, as the European and the American. Naturally, they have some common inheritance, and in the course of time there has been considerable interchange between them. As they have spread abroad a sort of hybridization has occurred, which has often improved the original stock.

In Europe the official international standardization of highway signs began as early as 1909, in a "Convention with Respect to the International Circulation of Motor Vehicles," signed in Paris. Only four symbols were adopted (Figure 18) with no prescription of sign shape or color. A subsequent convention in 1926 established a triangular shape for these danger signs, and in 1931, under the auspices of the League of Nations, a new "Convention Concerning the Unification of Road Signals" added a series of circular regulatory signs and rectangular informational signs, and took some steps toward standard colors. Red, for example, was to be the predominant color in "prohibition" signs—but not in danger signs where, to many of us, it might seem more symbolically appropriate. With a few necessary ex-

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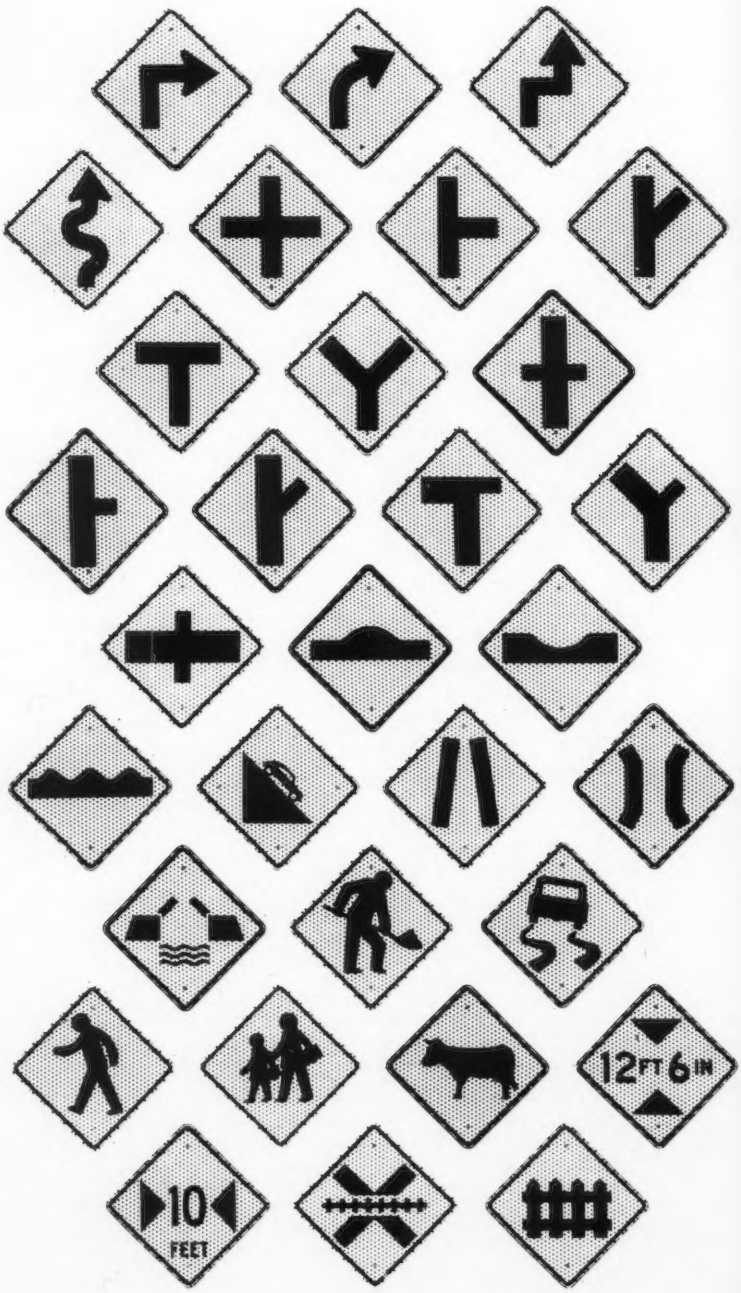
ceptions like geographic names all the signs were wholly symbolic. The basic system was generally accepted throughout most of Europe, though with many local variations in detail. Naturally it spread into widely scattered colonial territories.

American standards were officially adopted by the American Association of State Highway Officials in 1925. Here standardization was actually a by-product of a program set up to designate and mark an official network of major highways, and thus to end an uncontrolled, and often overlapping and competing, marking of tourist routes by private promoters. The basic concept of the now familiar "U. S." network, identified by route numbers and a distinctive symbolic emblem, and having directional markers at all intersections and turns, seems to have been peculiarly American. Elsewhere the emphasis has been placed on destinations rather than routes.

Almost inevitably a comprehensive scheme of uniform traffic signs was proposed for use on the new route network. It was confidently, and, as events have shown, justifiably, expected that these new standards would find extended application on all the rest of the State highway mileage.

The American standards offered more variety than the European, both in sign shapes and in messages. Warning signs were generally "diamond" shaped—square with one diagonal vertical. Regulatory signs were white rectangles having the longer dimension vertical, while directional signs were white and elongated horizontally. There were numerous exceptions, like the octagonal yellow "Stop" sign, the round railroad-crossing sign, and certain square yellow warning signs. Practically all the messages, were expressed by words in bold capital letters (Figure 19), rather than in symbols, an expedient which, from an unconsciously isolationist standpoint, was justified by our high degree of literacy in a single language. Subsequent experience has, of course, shown the advantage of adding a number of legible symbols, particularly for curves and intersections. The American standards have been generally followed throughout North America and to some considerable extent in parts of Central and South America.

With one scheme of signing well entrenched in Europe and its colonial dependencies, and another spreading over the Americas the prospects for worldwide uniformity in a symbolic highway language have not been too bright. In 1949, the United Nations held, in Geneva, a Conference on Road and Motor Transport, to bring up to



20

date the Paris Convention of 1926 and other related agreements affecting the international movement of motor vehicles. Included in the agenda was a proposed act of standards for highway signs, Although these were almost wholly European in character they were approved by the conference. They were not, however, incorporated into the basic Convention on Road Traffic adopted by the conference, but were designated as a "Protocol," for independent ratification. The conference then further requested the United Nations to name a special committee of experts to draft a globally acceptable code of road signs, signals, and markings.

The committee reviewed existing practices throughout the world, and attempted to combine the best of current standards, keeping in mind the need for a maximum utilization of symbols. In effect, it took a variety of highway sign languages and produced a sort of Esperanto, keeping most of the old roots but, for clarity of expression, setting up a simplified and consistent grammar. Even so, it retained some local idioms. It permitted, for warning signs, the use of either a triangle, a diamond, or a rectangle surmounted by a triangle. Similarly, for regulatory signs it prescribed only a ring or a disc symbol, permitting the use either of a disc with a wide border, or of a rectangular plate including or surmounted by a disc, having the message symbol within or below the disc. Yellow was prescribed for the background of warning signs, while the regulatory disc symbol was to be simply a dark color, it being assumed that followers of the European system would use red, but that others might use black so as to keep to two colors.

If used in this country the warning symbols proposed by the committee would, of course, be placed on diamond-shaped signs (Figure 20). The fact that some of these symbols are not immediately intelligible simply points up what has been said about the need for learning the meanings of even the best code of symbols. Undoubtedly a clever artist could improve some of the figures, and perhaps a fresh imagination could offer a different approach to some of the symbolization, but these symbols are what the committee arrived at after considering many alternatives. Note that the American curve and intersection symbols

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were taken over completely. The pedestrian, the school children, and the road maintenance man, have been conventionalized, and the steam locomotive is replaced by a "cross-buck" and a piece of symbolic railroad track.

For American use the regulatory symbols might, during a transitional period, be accompanied by inscriptions (Figure 21). The symbolic red ring is their most conspicuous feature. Note also that to express a prohibition a slanting red stroke is added, "crossing out" the symbol of a prohibited action or of an excluded class of traffic. Here again all of the meanings may not be equally obvious. The silenced automobile horn is definitely antique, but its symbolism is reasonably clear. The speed limit and the load limit are distinguished only by small letters indicating the units of measurement.

For the proposed "Stop" sign (Figure 22) the inscribed command, in English or in a local language, was to be superimposed on a broad horizontal bar crossed by a narrow vertical bar — an intersection diagram of a minor road intersecting a major road.

Time does not permit a lengthy comment on the many weeks of deliberation by the committee, in three long sessions, or on the research between sessions. The report of the committee was submitted in 1952, and the United Nations Economic and Social Council voted to designate it as the 1953 Protocol on Road Signs and Signals and to

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substitute it for the 1949 protocol. The Secretary-General of the United Nations was authorized to consult with the various nations as to whether the new protocol should be opened for signature and ratification. The response was not encouraging, and the council subsequently decided to let the matter rest, with a formal recommendation that the 1953 protocol be considered as a guide to national practices by those countries that might be considering changes in their standards.

The United States officially notified the United Nations that while it approved the protocol in principle it could not sign or ratify because, first, traffic control devices in this country are a responsibility of the various political subdivisions and it did not seem desirable to impose a single national system by law or treaty, and, secondly, because an international code would lack the flexibility needed if we are to keep up with our constantly growing and changing traffic.

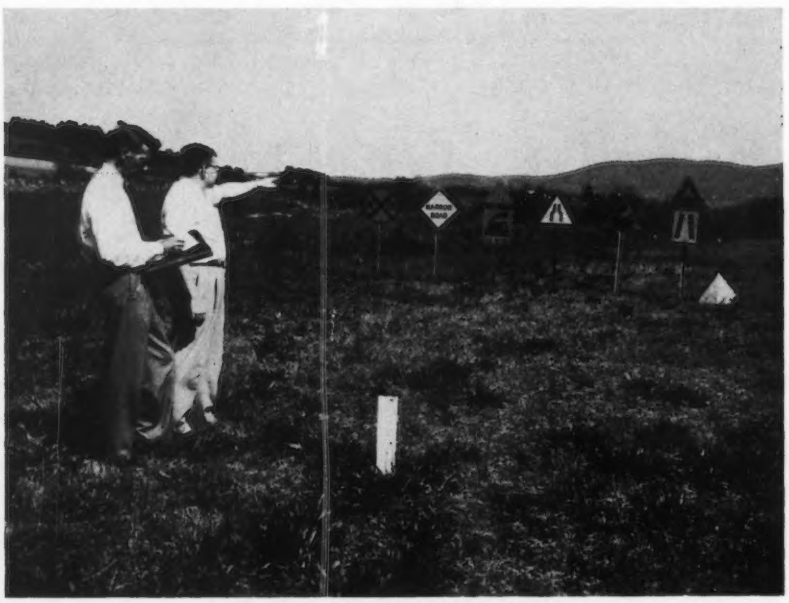
It was hoped that the 1953 protocol would altogether supersede that of 1949 as an adjunct to the 1949 Convention on Road Traffic. After its failure to receive the hoped-for support, however, the European countries turned back to the 1949 protocol and adopted it by regional agreement, thus firmly establishing a modernized European system in that part of the world.

The 1953 protocol, however, has been accepted as the basis for standardization in numerous countries, particularly where there has been a recent upward surge in highway transport. Turkey and Egypt, for example, outside the range of the European regional agreement, have modernized their signs in general conformity with the 1953 protocol. With the cooperation of the United Nations, a conference of Central American states in 1957 agreed on a slightly Americanized version of the 1953 protocol, and in connection with the Seventh Pan American Highway Congress in the same year an Inter-American meeting of traffic experts approved the adoption of essentially the same standards by all the American countries.

At this time it seems unlikely that the United States will take any major step toward accepting the United Nations standards as a comprehensive system. Our highway signs already have much in common with the protocol recommendations, as we have seen. We have only recently added to our standard signs the inverted yellow triangle, signifying "Yield Right of Way," taken directly from the protocol with only the addition of the inscription. Some of the other United Nations symbols might usefully replace our word legends, but we seem generally to prefer the clarity and precision of inscriptions.

In this country traffic control is traditionally a responsibility of the individual states, but a high degree of national uniformity has been attained under the leadership of the American Association of State Highway Officials and the United States Bureau of Public Roads, with the technical guidance of a semiofficial national committee representing many agencies interested in traffic control and safety. On the new National System of Interstate and Defense Highways traffic signs are being rigidly standardized, over the entire 41,000 miles of the proposed network. On our other state highways uniformity is less complete, but still so generally consistent as to offer little difficulty or confusion to the traveler. Our major troubles are on city streets and local secondary roads, where directional guidance is too often inadequate. Local authorities are rarely experts as traffic engineers and many fail to recognize the needs of motor travel. In cities the complications of traffic, street design, and competing visual stimuli are often such as to make adequate control devices almost impossible. The problem frequently lies deep in the design of the roadways themselves. In such cases, symbology can offer little help.

Despite the clear advantages of a basically uniform system of traffic control devices throughout the world, using a simplified system of symbols that can be universally understood, we must concede that progress has been and will probably continue to be slow. Widely separated countries can see little immediate need for exact agreement, especially when they think their devices are better. A lot depends on what we are used to, of course, and we forget that some day we may fare abroad and find something we are not used to. Some give and take is necessary for the attaining of uniformity. We can feel some satisfaction in the evidence of progress, even though it is slow, toward the acceptance of the United Nations standards.



Research work between committee sessions.

Improving Freeway Traffic Accident Reporting

By B. F. K. Mullins
Research Engineer
Texas Transportation Institute, and
Professor of Engineering Drawing
A. and M. College of Texas

Two significant improvements in methods of reporting accidents have been developed in research investigating the correlation of safety with freeway design and operation.

One improvement is a system for establishment of specific reference points at frequent intervals for precise location of accidents. It suggests flexibility in placement and numbering sequence to meet the needs of each highway facility.

The other improvement provides adaptable diagrams of several typical freeway sections on which simple nomenclature is shown. These are proposed to replace the usual collision diagram sketch areas on the standard accident report form only for freeway accidents. They are to be attached to the standard form on which textual data will be supplied. Other special diagrams to fit particular complicated interchange areas should be developed by each city or other authority.

Advantages of these two improvement features, to enforcement officials and to engineering and research, have been demonstrated by trial use over approximately a year by several cities in Texas.

EVERY EFFORT to curb the tremendous toll of highway traffic fatalities, injuries, and property damage encounters the problem of *inadequate reporting of accidents*. Engineering, enforcement, and education can all play a vital part in the stepped-up campaign for improvement requested by President Eisenhower in his recent budget message with the advice of his Traffic Safety Committee. But analysts in all three of these areas of effort are fumbling in the dark when they seek the causative factors of traffic accidents and try to determine what remedies might be applied. In order to study such accidents properly it is necessary to have precise information concerning location and manner of occurrence of each accident. Such data are important in traffic accident studies on all types of highways, but even more so in research on freeways because of the more complex design—which also makes reporting more difficult. Usually in traffic accident studies the data on precise location and manner of occurrence are not available and conclusions are sometimes drawn with difficulty and hestitation.

For example, the need for development of improved methods of reporting accidents became evident early in a research project (Freeway Traffic Accident Analysis and Safety Study) the Texas Transportation Institute is presently conducting for the Automotive Safety Foundation. The primary objective of the research is to determine the relationships between freeway traffic accidents and the design and operational features of the freeway. Some 10,000 freeway traffic accident reports covering from one to four years in the five largest cities in Texas were microfilmed for comprehensive study and analysis. From these records, accidents were plotted as continuous collision diagrams on strip maps showing the geometric layout of some 54 miles of urban freeways.

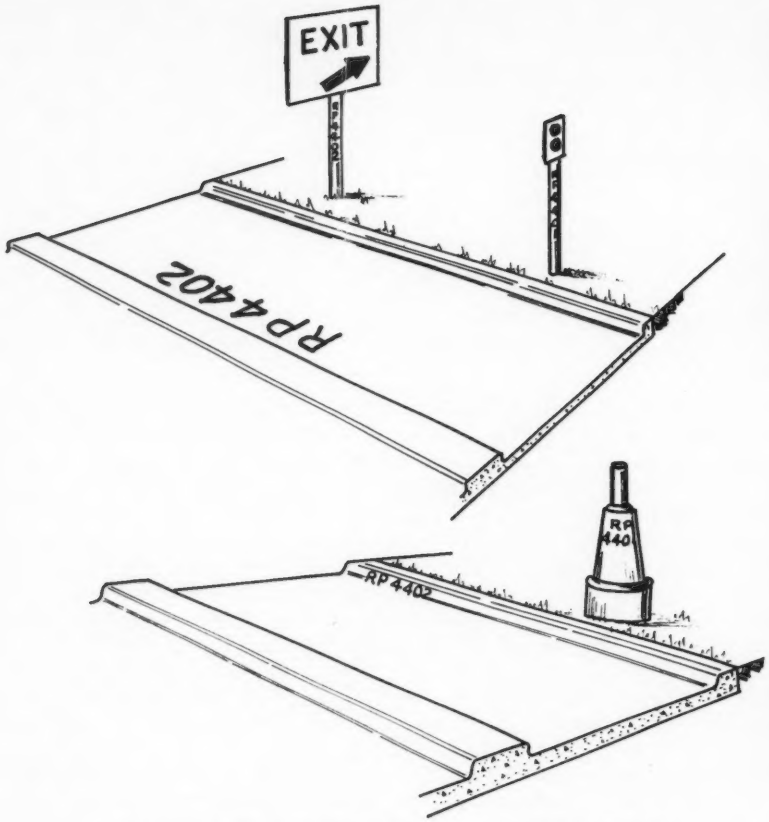
Effort was made to spot locations of accidents accurately enough, both longitudinally and laterally, to provide correlation of accident location and type with specific geometric roadway features such as entrance and exit ramps, speed change lanes, frontage roads, overpass structures, guard rails, sight distances, grades, etc.

Three primary difficulties were encountered at this point. They are described as follows:

1. Confusing Terminology—Even engineers cannot always agree on the best terminology for specific geometric roadway features with varying complexity of design. Hence it is to be expected that police personnel who investigate accidents would be less familiar than engineers with the complicated engineering terminology. Verbal description alone is often insufficient. Many general terms are used which cannot adequately describe specific features. For example, the term "feeder street" was often used indiscriminately in referring to an entrance ramp, a frontage road, or even a cross street intersecting the frontage road. "Esplanade" was used to refer to either the median between the opposing through lanes, or to any of the outer separation areas between the through lanes and the frontage roads, or even to the median of a cross street.

2. Indefinite Location—The general practice of most city police departments to use block numbers and to reference accident locations to street intersections is not well suited to freeway accidents, because accuracy is not sufficient to enable the engineer to relate the accident occurrence to the design features. In many cases location was given only by block, and often even the block information was inaccurate. In this study, the proportion of accidents which could not be plotted, most often because of inexact location information, ranged from five per cent for one freeway to sixty per cent for another.

3. Inadequate Diagrams—Frequently the sketched diagrams contributed nothing in clarifying the vague terminology of the verbal portion of the report, in fact sometimes they were conflicting or inconsistent. Obviously the average accident investigator has great difficulty in drawing diagrams which clearly describe accident loca-



SUGGESTIONS ON REFERENCE POINTS FOR FREEWAY LOCATION

Suggested system of reference point numbering
- a. Block serial systems recommended for urban areas.
- b. Establish block numbers if possible; otherwise, establish an independent numbering system, with numbers on alternate sides of roadway. For example, RP AO, RP A1, RP A2, etc.

Place reference point numbers parallel to center line of roadway
- a. On street light standards, sign posts, delineator posts, structures, etc.
- b. According to freeway design: on face of right-hand curb of freeway proper.
- c. If there is no right-hand curb, place on median curb or on median barrier fence.
- d. If there are no curbs or only mountable curbs, place on inside lane (next to median).

Method of application: Paint, Stencil

Figure 1

Reference Marking on Inward Face.

Reference Marking on Outward Face.

Figure 2: Showing opposite faces of two reference points located about a block apart.

tions or even in adapting the printed diagrams of the customary report form.

Some other difficulties in securing proper information for plotting accidents were: (1) inconsistencies between references to direction of travel; (2) illegibility of writing or lettering on the report; (3) incomplete data; and (4) unnecessarily disproportionate size of vehicles sketched on the diagrams. Obviously improvement in these matters will depend primarily upon development in care and skill of the investigating officers.

Establishing Reference Points For Locating Accidents

A suggested system of establishing specific reference points along the freeways from which accidents can be accurately located was recommended to the participating cities and has been established in most of them. The system involves:

1. Use of a serial number for each reference point, incorporating the block number along with the serial number where applicable and where police departments feel that it would be helpful.

2. Spacing of reference points generally not more than 300 feet apart on alternate sides of the through roadways and more closely at interchanges.

3. Using street light standards, where present, as convenient locations on which reference points may be stenciled or attached. An investigating officer can easily see these from either side without having to cross the freeway and may measure to the nearest point much more easily, more accurately, and usually at a shorter distance than to the nearest cross street. Where street lighting standards are not available, reference numbers stenciled or attached to sign posts, structures, delineators, etc., or on median or outside curbs are suggested.

Distances along the longitudinal direction of the freeway are of course measured approximately parallel to the freeway center line.

Figure 1 illustrates possibilities for placement of reference points, and Figures 2-5 show typical installations. Figure 2 demonstrates that placing the numbers on both inward and outward faces of the light standard with respect to the freeway median makes them visible from any lateral position on either side. Figure 5 shows the establishment of reference markers on the guard rail of a barrier fence along the median of a freeway. Accumulation of "traffic film" and difficulty of cleaning the attached or stenciled markers presents a problem in this type of installation. The same is true if the reference points are stenciled on curbs.

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Reference Marker on Transformer Base of Lighting Standard.

Figure 3

Figure 4

Reference Marker on Guard Rail of Median Barrier Fence.

Figure 5

Placing of reference points on any existing roadside feature in the outer separation area or the marginal area, at a height and position where they may be quickly identified from either side of the freeway and where "traffic film" will not obscure the numbers, is acceptable. Local availability of such features and preference of local authorities should determine placement.

Comments from police officials where such reference points have been established indicate satisfaction with their use. These comments emphasize the relative closeness of the reference points and their convenience to investigators in providing a greater number of places to use as distance markers from which to locate collisions. Other comments approve the greater clarity afforded by the new reference points.

Providing Improved Diagram Forms

The pre-drawn dotted diagram of a typical street intersection which is provided on most standard accident report forms cannot be easily modified to represent the rather complicated design features of freeway interchanges or even of a tangent section of a multilane freeway facility. For example:

Figure 6-a is a copy of an actual collision diagram on the standard form where six different vehicles were indicated by the verbal report to have been involved in the accident. Yet the relative locations of these vehicles, their identification, and their manner of contact are confused on the diagram. Equally important, the features of the freeway—lane arrangement, "esplanade," and even cross street—are not consistent with the design of the six-lane overpass of the freeway over the cross street. No distances are given in either sketch or verbal report.

Figure 6-b illustrates the inadequacy of another actual accident report collision diagram on the standard form. The verbal report seemed to place the accident on a through lane tangent section of the freeway yet the lanes are not shown and even the presumed off-ramp is questionable. No reference point existed and no distance tie is given—not even to the presumed ramp entrance. Since the next adjacent cross street is not shown and was not mentioned in the verbal report only a location within a block is possible.

Figure 6-c represents a rear-end accident which may have happened on the entrance ramp to a through lane tangent section of the freeway or it might be on a street angularly intersecting the frontage road, since the lanes are not identified nor is the shaded area which might be a median or an outer separation area. Futhermore the adjacent cross street or the possible intersecting street name is uncertain. Since no distances are given, location could be only within a certain block and the specific location with respect to the entrance point of on-ramp or intersecting street could be only roughly estimated.

In an attempt to eliminate at least some of the confusion, typical diagrams of several freeway sections on which simple nomenclature is shown, were developed with the help of an advisory committee composed of police officers and traffic and highway engineers. These were furnished to the police departments of each of the participating cities for trial use. They were printed on both sides of sheets of the size used for standard accident reports. Being bound flexibly they facilitate the making of carbon copies of either side simply by reversing the pad. The diagram most nearly like the area where an accident occurred would be selected by the investigator and modified if necessary to represent that area.

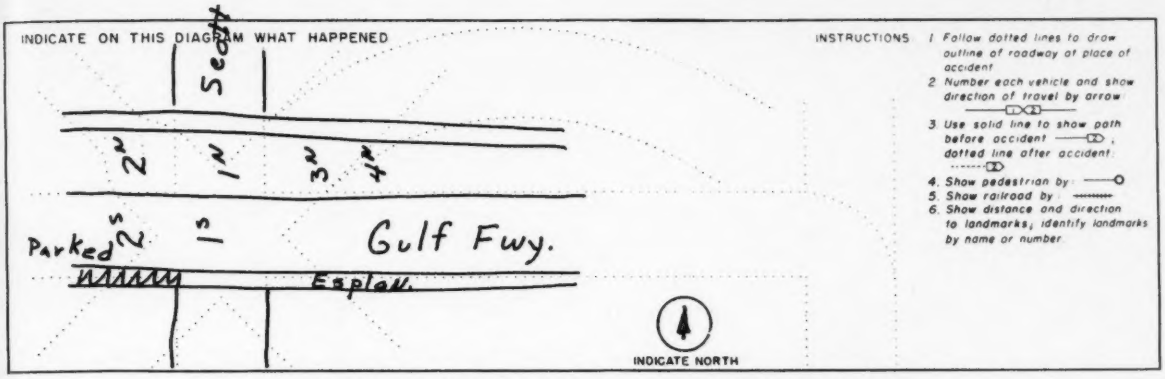
Figure 7-a shows a three-car, rear-end, and side swipe accident on the through lanes of a typical diamond interchange with measured distance from the point of impact to a specific reference point, and all adjacent features including nearest cross street and other information which might have a bearing on the occurrence of the accident.

Figure 7-b shows the precise location of a two-car, rear-end accident on an off-ramp, with a definite tie to a specific reference point and showing adjacent cross street and other pertinent information on this area which is a typical "X" interchange.

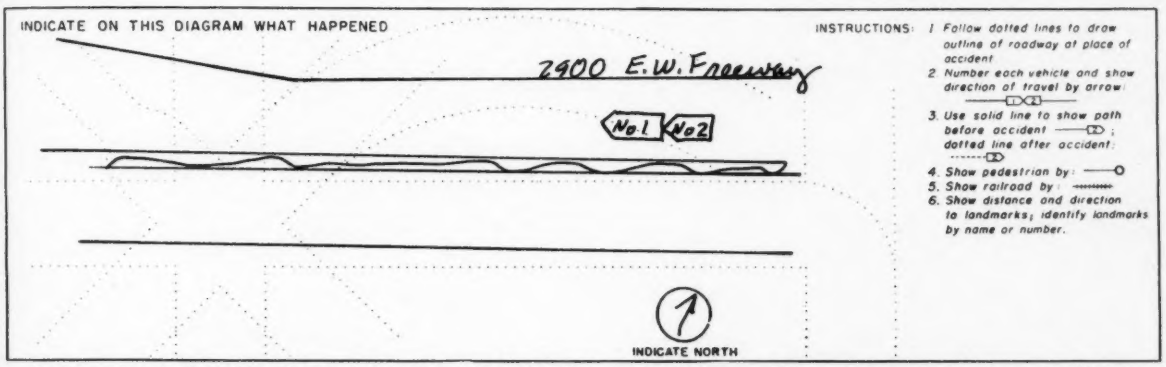
Figure 8-a definitely locates a two-car, rear-end accident on the on-ramp of the southeast loop of a typical clover leaf interchange, with a complete diagram of the interchange and all pertinent features. The location of this accident could hardly be shown accurately without a special diagram.

Figure 8-b presents the precise location of a two-car, rear-end accident on an on-ramp at a typical intermediate area between interchanges, with adjacent cross street and all pertinent information including tie to a specific reference point.

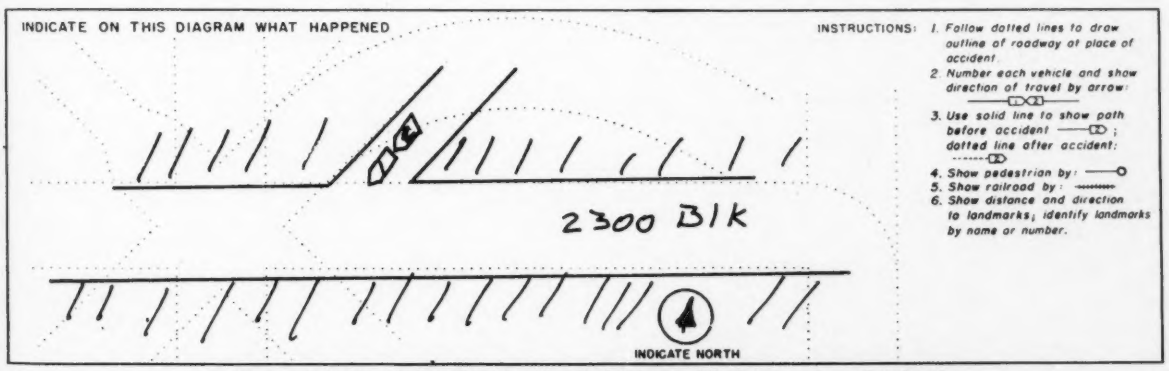
It is, of course, anticipated that the standard report form will be used for all data other than the collision diagram. The freeway collision diagram would be attached to the standard report form, and the serial (case) number stamped on each. The participating cities have found this procedure to be practicable. These typical diagrams, suggested for use only on freeways, will certainly not fit all sections of the freeways. Therefore, it will be necessary for each city to develop special diagrams to fit special complicated areas. However, it is believed that these typical freeway diagrams will (1) fit most cases, (2) make the sketching job much easier and faster, especially in the field, and (3) help to familiarize the investigator with ac-


INDICATE ON THIS DIAGRAM WHAT HAPPENED
INSTRUCTIONS: 1. Follow dotted lines to draw outline of roadway at place of accident.
2. Number each vehicle and show direction of travel by arrow.
3. Use solid line to show path before accident; dotted line after accident.
4. Show pedestrian by:
5. Show railroad by:
6. Show distance and direction to landmarks; identify landmarks by name or number.
Sedgt
2nd
1st
3rd
4th
Parked
2nd
1st
Gulf Fwy.
Esplan.
INDICATE NORTH

(a) Through-lane Accident Inadequately Described and Unsatisfactorily Located.


INDICATE ON THIS DIAGRAM WHAT HAPPENED
INSTRUCTIONS: 1. Follow dotted lines to draw outline of roadway at place of accident.
2. Number each vehicle and show direction of travel by arrow.
3. Use solid line to show path before accident; dotted line after accident.
4. Show pedestrian by:
5. Show railroad by:
6. Show distance and direction to landmarks; identify landmarks by name or number.
2900 E.W. Freeway
No 1
No 2
INDICATE NORTH

(b) Manner of Accident Adequately Indicated but Located Only Within the Block Since no Distance is Given to the Presumed Off-ramp.

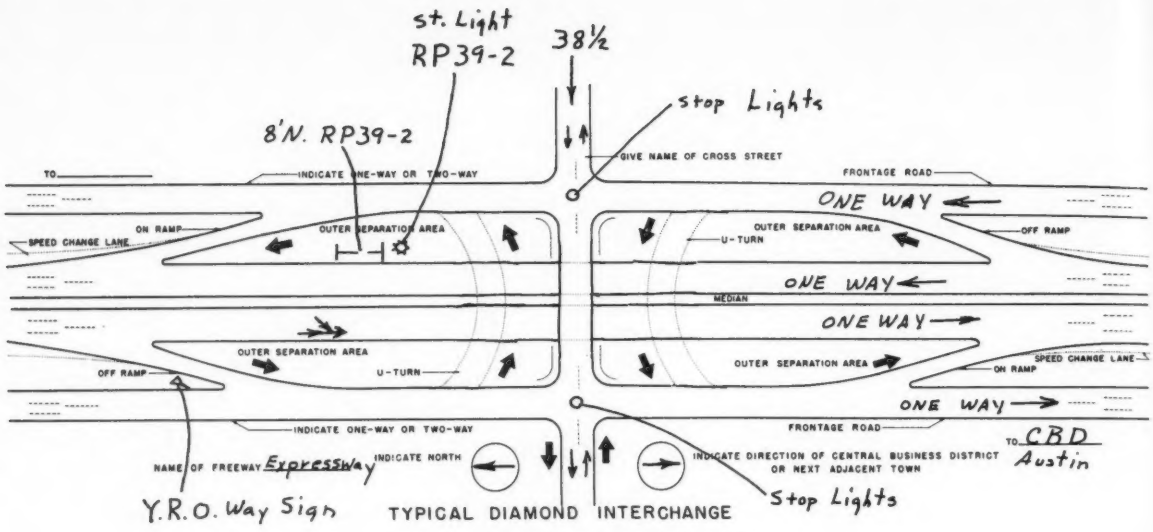

INDICATE ON THIS DIAGRAM WHAT HAPPENED
INSTRUCTIONS: 1. Follow dotted lines to draw outline of roadway at place of accident.
2. Number each vehicle and show direction of travel by arrow.
3. Use solid line to show path before accident; dotted line after accident.
4. Show pedestrian by:
5. Show railroad by:
6. Show distance and direction to landmarks; identify landmarks by name or number.
2300 Blk
INDICATE NORTH

(c) Manner of Accident Indicated but Location Doubtful as to Whether on a Ramp Entering the Through-lanes or on a Street Intersecting the Frontage Road.

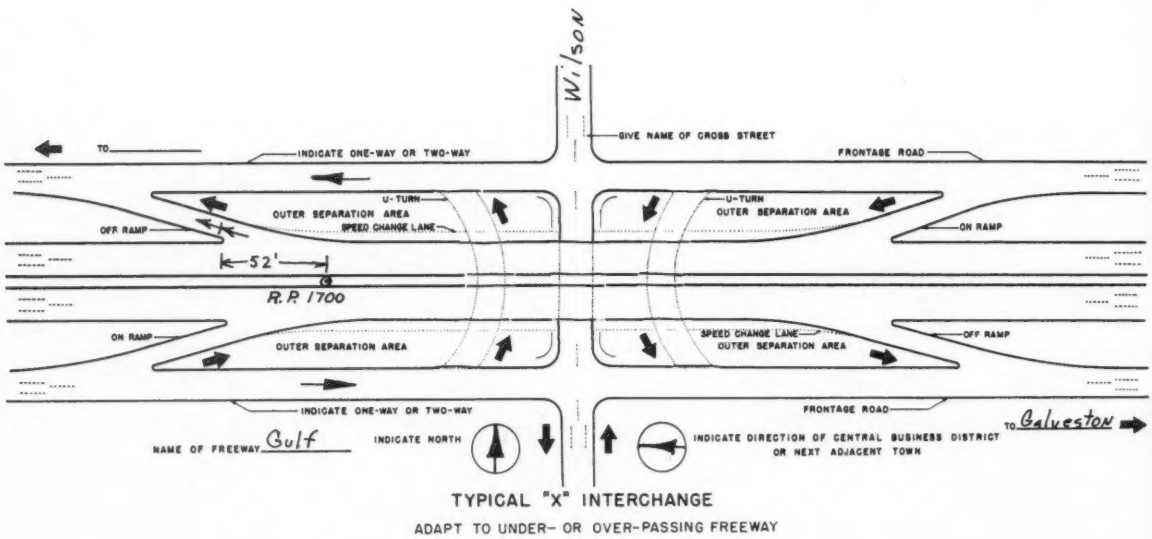
Figure 6: Showing Standard Accident Report Form with Collision Diagrams Unsatisfactory for Freeway Reporting.

cepted freeway nomenclature. Consequently, the engineer will have available more accurate and easily interpreted diagrams in making accident studies. The enforcement officials will have more reliable data on which to base action in court.

Four of the cities cooperating in the project have made some use of the suggested freeway diagram forms. Experience confirms the benefits which were anticipated. In most cases it appears that such use has been supplementary to the collision diagrams already in use, and has been accomplished generally in the office rather than in the field. From the viewpoint of the police accident investigator, one of the main advantages of the proposed freeway diagram is to provide for him a ready-made sketch requiring little modification in showing the accident location, thus saving him time and effort in the critical moments of his investigation. Only a few simple measurements should be required in the field, tied to a reference point, and with additional notations concerning factors which might affect the accident. These measurements and notations may be made merely in the investigator's notebook in the field and later transferred to the special freeway diagram. However, on-the-scene use of the special freeway diagram deserves considerable emphasis and al-



(a) An Accident on the Through-lanes.



(b) An Accident on an Off-ramp.

Figure 7: Use of Typical Freeway Diagrams Encourages Satisfactory Location and Description of Accidents on the Freeway.

most certainly would provide a more reliable picture of the true accident situation.

Problems have of course been encountered in the use of this form:

1. Foremost among these is that of training in its use all officers who investigate accidents on freeways.

2. Next is the problem of providing them with a convenient and ever ready supply of forms. This is much simpler where only special freeway accident investigators are regularly assigned to freeway accidents, but much more complex where any officer on the accident investigation staff may draw assignment to freeway accidents.

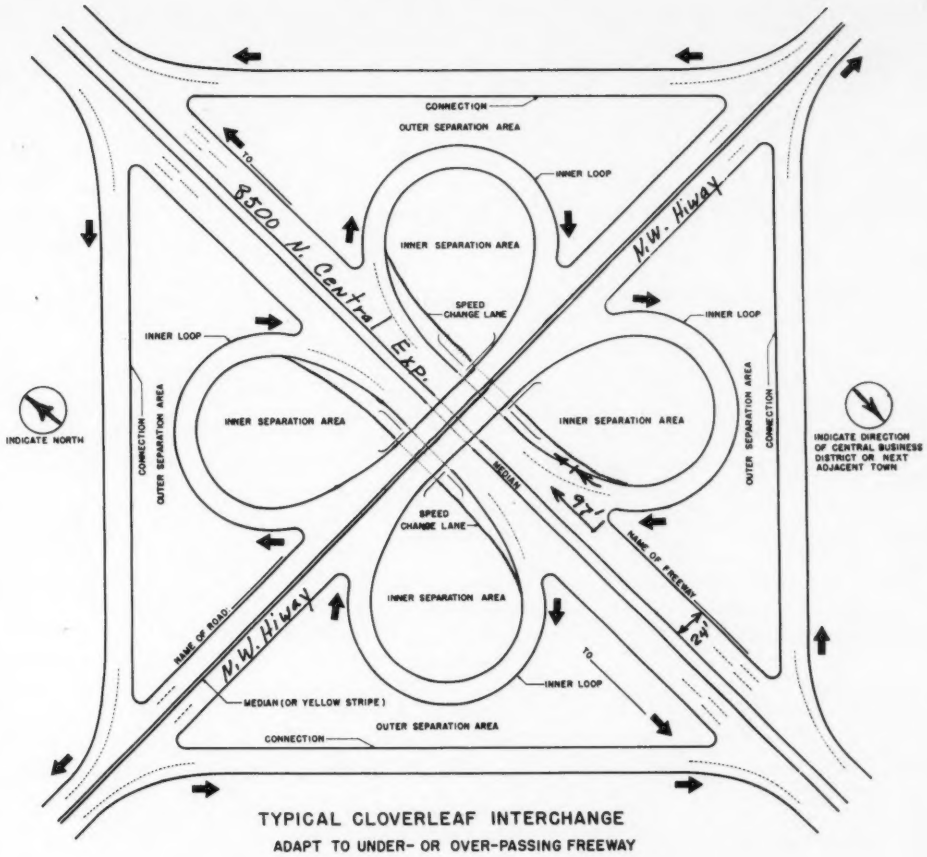
3. Most complicated of all is the situation where no special assignment is made to accident investigation but any police officer may investigate.

4. Changing tours of duty and use of different police cars by the same man at different times necessitate a wider spread in training and in supply of forms.

The freeway diagrams furnished at present for trial use have been bound in pads of fifty sheets. However, it has been found that with such pads it has been necessary to tear out sheets in order to distribute a few to each accident investigator. Since it is difficult to keep these loose forms neat and unwrinkled, it is reported that officers have often discarded such marred forms and have sometimes quickly run out of supply. Therefore it would seem that pads of not more than twenty-five sheets would be more practical and economical.

Where the special freeway diagrams have been tried consistently, their superior value seems to be recognized

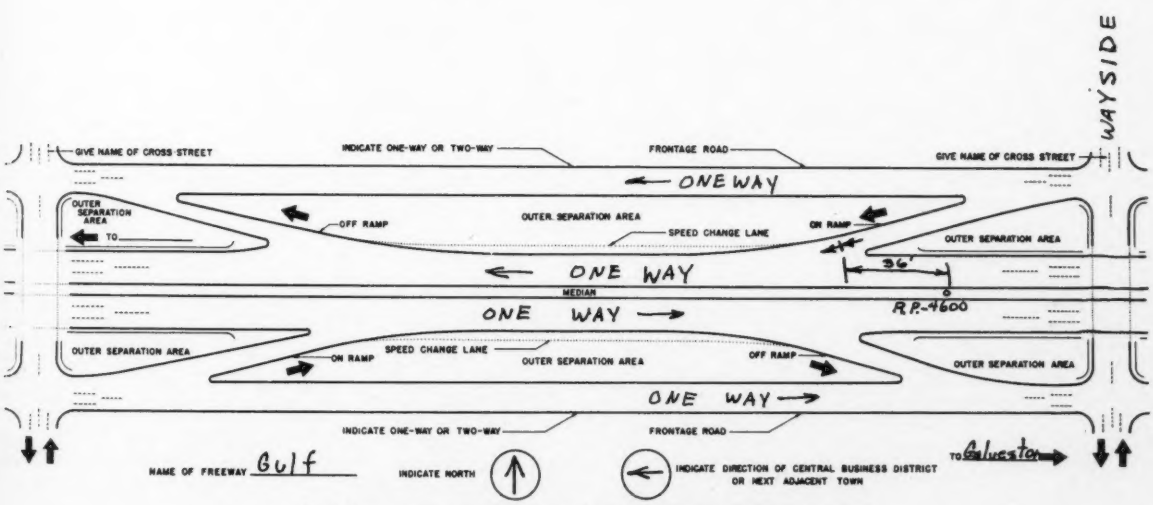
(Continued on page 54)



TYPICAL CLOVERLEAF INTERCHANGE

ADAPT TO UNDER- OR OVER-PASSING FREEWAY

(a) An Accident on an On-ramp of a Loop of a Cloverleaf Interchange.



TYPICAL INTERMEDIATE AREA-BETWEEN INTERCHANGES

ADAPT TO UNDER- OR OVER-PASSING FREEWAY

(b) An Accident on an On-ramp Approaching an Intermediate Area.

Figure 8: Better Accident Reporting on Other Freeway Sections.

Fifth International Study Week In Traffic Engineering

By Alger F. Malo
President
Institute of Traffic Engineers

THE FIFTH International Study Week in Traffic Engineering and the 1960 International Road Safety Congress were held in Nice, France. The first was held from September 26 through October 1; the second took place October 3, 4, and 5.

The Fifth International Study Week was attended by approximately six hundred delegates representing thirty countries. Delegates from the United States, in addition to me, included Burt Marsh, Henry Barnes, Bruce Murray of Philadelphia, and Professor Edgar Horwood of the University of Washington and now an exchange professor at the University of Denmark.

There were twenty Institute members at the Fifth International Study Week representing nine countries. Fletcher Platt, Affiliate of ITE and Manager of the Traffic Safety and Improvement Department of the Ford Motor Company was also in Nice but only for the 1960 International Road Safety Congress.

All of the sessions were held at the large and attractive Palais de la Méditerranée—Nice's convention headquarters. It is located on the Promenade des Anglais, the main street facing the Mediterranean and the street on which the major hotels are located. Nice is somewhat similar to Miami in this respect except that their main road lies between the beach and the hotels.

Registration began on Monday morning at nine o'clock. The Study Week was opened at three o'clock that afternoon by the Minister of Public Works and Transport of France. A reception sponsored by the Municipality of Nice was held that evening in the formal gardens and building of the Villa Masséna.

The formal sessions began Tuesday with two sessions being held each day except Thursday and Saturday afternoon. Sessions began at 9:30 a.m. and ran until noon. The afternoon sessions ran from 3 p.m. to 6 p.m. The program included: 1. Traffic and Parking Needs Generated by Building Development; 2. The Problem of Capacity in Road Planning; 3. Economic Losses due to Traffic Congestion; 4. Individual and Mass Transport in Urban Areas; 5. Visual Aids to Driving on Urban and Rural Roads; 6. The Influence of Speed and Speed Regulations on Traffic Flow and Accidents; 7. Problems of Intersection Design.

Three general forms of presentation were followed during the sessions. Each session was presided over by a Chairman. Permission to ask a question or to discuss the subject matter was requested in writing on a prepared form which was turned in to the Chairman in advance of each meeting. If time allowed, additional questions were accepted without the formality of the written request.

One type of presentation included in addition to the Chairman, a lecturer who presented a paper on the subject of the session, and panel members who made brief statements, discussed the subject generally, and answered questions from the floor.

A second type included the Chairman, and a general reporter who presented a summary of papers which had been prepared in advance. These were printed in book form and distributed to registrants at the beginning of the meeting.

If the authors of the papers were present, they were asked to sit on the platform to discuss the subject or to answer questions.

The third type included the Chairman, and a number of lecturers who presented papers not printed in the advance publication.

All lectures, questions, and discussions were simultaneously translated into English, French, and German. This was done by radio. All in attendance were provided with a headphone connected to a pocket-size radio receiver. Each language was broadcast on a different wave length. The language desired was selected by use of a dial on the side of the receiver. Volume adjustment, of course, was provided. The translations were made by experienced girl interpreters who handled the technical terms exceptionally well.

The attendance at all sessions was practically one hundred per cent. This is in contrast to our meetings where there are sometimes many members in the halls outside having private group discussions. I think this stems largely from the language differences. It is difficult to discuss the problems of Germany with an engineer from Cologne if he speaks only German and you speak only English. Too, some of the lectures prepared for presentation were available only in one language. If you were not familiar with this particular language and were interested in the paper you had to attend the meeting to hear the translation. I am not discounting the fact that the participants at the Study Week were all seriously interested in the subjects presented and desired to obtain the greatest value possible out of the meetings, but I believe the different languages did play a part in bettering their attendance at all of the sessions. Admittedly, all of the subjects did not generate equal interest—this was evidenced by the number of questions and amount of discussion requested.

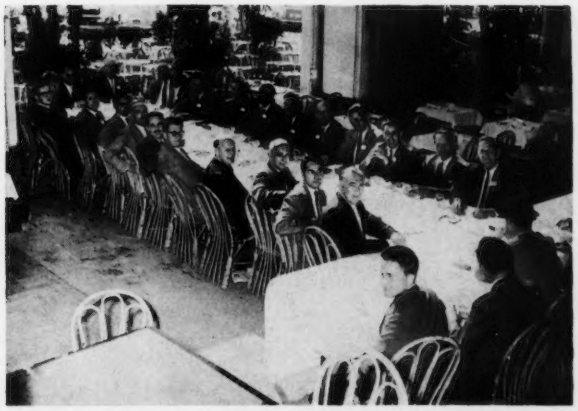
Thursday was set aside for a field

ITE President A. F. Malo (left) chats with Sir William Glanville, director of road research, Road Research Laboratory, Great Britain.

Pictured near the exhibits (left to right): A. F. Malo, USA; R. J. Smeed, deputy director, Road Research Laboratory, Great Britain; Mogens Bare, secretary, Royal Danish Automobile Club; and Burton W. Marsh, USA.

President Malo and Study Week dignitaries: (left to right) Mr. Malo; Paul Le Vert, United Nations; A. Rumpler, director general of the International Road Federation, Paris; Henri Hondermarcq, director general for roads and bridges of the Belgian Ministry of Public Works; Pierre Mothe, chief engineer of roads and bridges, Department of Seine & Oise, France; and J. F. A. Baker, chief engineer (highways), Ministry of Transport, Great Britain.

Typical session, with participants using radio for simultaneous interpretation into English, French and German. In the foreground is Professor Edgar M. Horwood (ITE) of the Department of Civil Engineering, University of Washington. Mr. Malo is directly behind him.



Two views of the ITE luncheon at Nice, attended by 17 members of the Institute and 15 guests. Following the luncheon, President Malo and Mr. Marsh spoke to the group about the Institute and about the plans for the 1961 meeting in Washington.

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trip over the Autoroute de l'Esterel, a toll road partially completed northeast of Nice.

The caravan included sixteen bus loads of participants—many of whom had their wives. Lunch was provided at restaurants in Cannes. The afternoon was set aside for sightseeing along the beach and in the town. Incidentally, most of the homes in towns along the French Riviera and in Southern France are three-, four-, and five-story apartments, built of masonry, and located on the top of mountains or high hills. This is in contrast to our mountain areas where the villages are built in the valleys and practically all residents live in individual homes. The mountains at Cannes seem to crowd right up to the sea, and the town has its share of steep, narrow streets lined with the usual apartments. After investigating some of these areas we appreciated the opportunity to sit and rest at a sidewalk café.

The closing session was held on Saturday ending at noon. The "gala dinner" or banquet was held Saturday evening.

During the week, a meeting of the Sub-Committee preparing the program for the World Traffic Engineering Conference in Washington was held. A meeting of the main committee, the Joint Committee of OTA (World Touring and Automobile Organization), PIARC (Permanent International Road Safety Congress), and IRF (International Road Federation), was also held. These were attended by Burt Marsh, Henry Barnes, and me. The preliminary program for the World Traffic Engineering Conference now has been approved and the participants have been tentatively chosen. It may be interesting to note that in these committee meetings both French and English were spoken and translations had to be made by the secretary.

An ITE Luncheon was held during the Study Week and was attended by seventeen ITE members and about fifteen guests. Burt Marsh and I spoke to the group after the luncheon. I had been told that some of our foreign members were interested in forming a European Section so I urged them to take this opportunity to have a meeting for the purpose of discussing the subject. They did so before the end of the week, and I have been informed that some temporary officers have been voted in for the purpose of investigating the possibilities of a European Section. Burt Marsh spoke to them regarding the plans for the World Traffic Engineering Conference in Washington next year. It is interesting to note that of the fifteen ITE European members in Nice, four were on the Study Week program. I prepared a paper on "Individual and Mass Transport in Urban Areas" and was a member of the panel.

Mrs. Malo and I spent an additional two and a half weeks on vacation in Europe prior to and following the Study Week. We visited Paris, London, and Rome plus short stops in Florence, Venice, Lucerne, and Zurich.

It is easy to understand why one of the major subjects of the Study Week was "Individual and Mass Transport in Urban Areas." Mass transportation is patronized to the extent of overcrowding in London, Paris, and Rome. In addition, individual transportation in the form of automobiles, bicycles, motor bikes, and scooters congests their streets worse than any of our American cities.

Paris traffic is especially undisciplined. Some years ago, the Paris driver had the use of the horn taken away from him. He now tries to get there first by intimidating other drivers and forcing his way ahead. There is a decided lack of "stop" signs and therefore little regard for the flow of traffic on the main arteries. Turning traffic blithely attempts to merge in spaces much shorter than a car length; pedestrians weave their way between moving automobiles fearlessly. (We were not so fearless and had some anxious moments.) The subways in Paris are excellent and well patronized. I rode one of their pneumatic-tired trains and enjoyed its quietness in contrast to the normal subway rail car. I was informed that they plan to convert another line to pneumatic-tired trains, and eventually the entire system. Paris has an extensive bus system which is also well patronized.

Rome has only one short subway so their surface bus and trolley coach system is always crowded. Buses often start from the curb with passengers hanging on in a perilous fashion. Vehicular traffic operates practically the same in Rome as it does in Paris.

Traffic in London is more disciplined. However, it is extremely crowded with both vehicular traffic and pedestrians, and it is not unusual to see eight or ten double-decked buses following one another along a main street. London's subway system is very good and operates at the saturation point during some peak periods.

Air travel in Europe is extensive and well patronized, but the railroad stations we saw seemed to be the busiest places in the country. Rome, especially, with its large and modern railroad station was extremely crowded at all times. We traveled by train in Italy and Switzerland and found the Italian trains to be good and the Swiss trains excellent.

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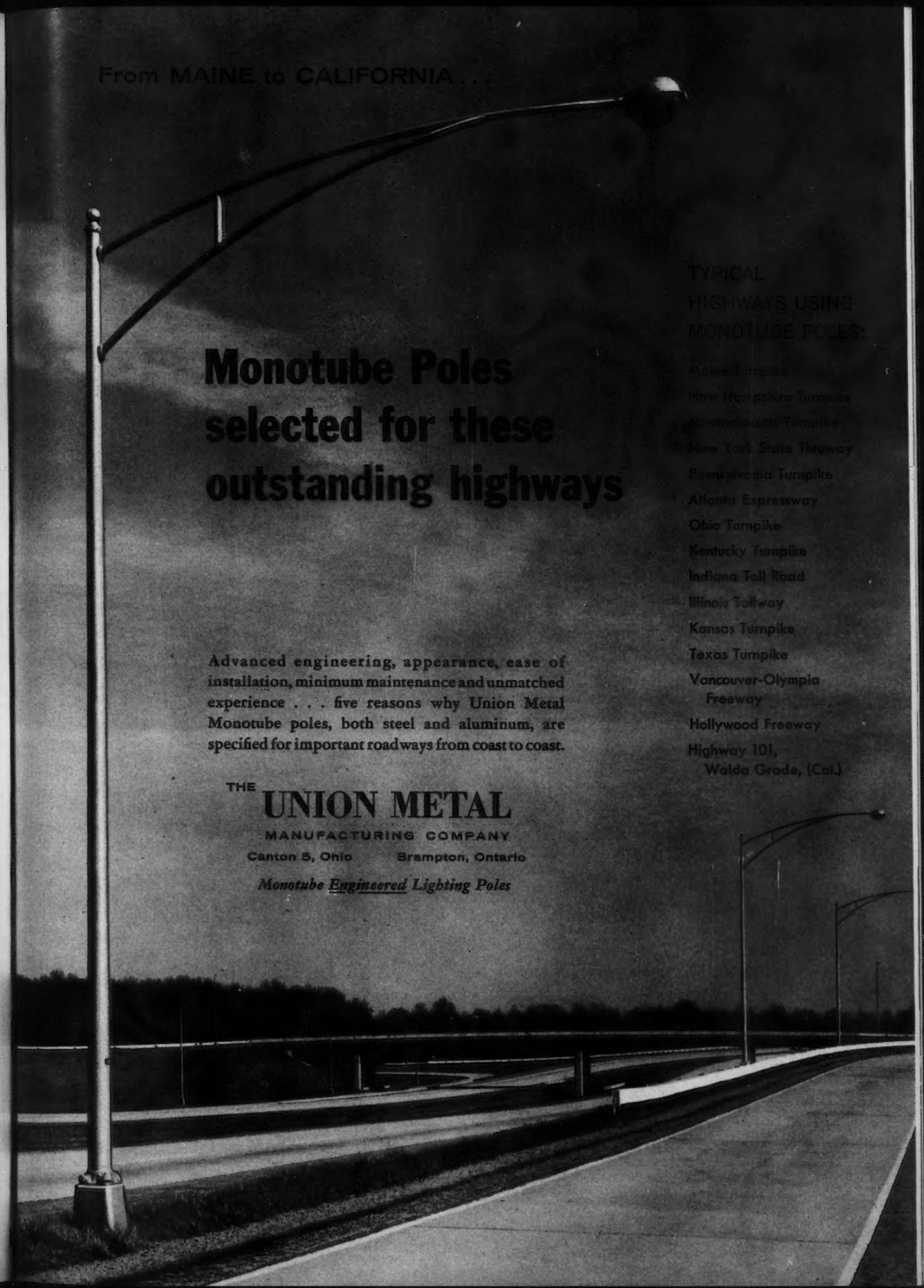
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Traffic News

Hoffman Award Presented to Judge Finesilver

The Paul Gray Hoffman Award for distinguished professional services in highway safety was conferred upon Judge Sherman G. Finesilver of the Denver, Colo., Municipal Court.

The award was presented at the United Nations offices of the donor, Mr. Hoffman, former president of Studebaker Corp. and himself a noted pioneer in the U. S. highway safety movement. Mr. Hoffman, former ECA Administrator, is now serving as managing director of the United Nations Special Fund.

Purpose of the award is to recognize and encourage the work of educators, enforcement officials, engineers, researchers, organization staff members and others who make their careers in traffic safety.

Judge Finesilver was honored for his leadership in raising the standards of traffic court administration in his city; for creating a model driver improvement school; and for other contributions to reduce the traffic accident toll.

The 33-year old jurist is widely known for his work with teen-age drivers. He also has conducted traffic safety seminars at the Air Force Academy, Lowry Air Force Base, the Federal Correctional Institution for Boys at Englewood, Colo., and lectured at the Denver Police Academy, the Colorado State Patrol and many other groups. He was selected as Denver's Outstanding Young Man of 1957 by the Junior Chamber of Commerce and in 1959 received a citation of merit from the National Safety Council.

In presenting the award, Mr. Hoffman pointed out that while the nation's mileage death-rate (traffic deaths per 100 million vehicle miles) has been cut in half since World War II, motor vehicle accidents still cost the United States some 38,000 lives and 1,400,000 injuries a year, besides economic losses exceeding six billion dollars.

"We know that an aggressive program of education, enforcement and engineering, with the leadership of qualified professionals, can reduce this heavy drain on our resources," he said. "Our traffic court judges have a key role in this program. The initiative and dedication which Judge Finesilver has shown both in and out of court serve as an example not only in the field of traffic court administration but in every phase of highway safety."

The board of judges for the Hoffman Award includes Ellis L. Armstrong, Commissioner, U. S. Bureau of Public Roads; Dr. John A. Hannah, President, Michigan State University; Herschel D. Newsom, Master, the National Grange; W. Earl Hall, Editor, Mason City (Iowa) Globe-Gazette; and Mrs. Raymond B. Sayre, Chairman, Women's Group, President's Committee for Traffic Safety.

The award, now in its fourth year, is administered by the Automotive Safety Foundation of Washington, D. C., an organization in which Mr. Hoffman served as chairman and president.

New Sign Manual Approved; to be Available Soon

The new Manual on Uniform Traffic Control Devices has now been approved by all responsible agencies, and will soon be published by the U. S. Government Printing Office. Approval was obtained from all five of the parent organizations to make this possible—the Institute of Traffic Engineers; the American Association of State Highway Officials; the National Committee on Uniform Traffic Laws and Ordinances; the American Municipal Association; and the National Association of County Officials.

The new Manual represents the first complete revision of the publication since 1948. Numerous changes were made by the committee, which is composed of representatives from the sponsoring organizations. The Institute delegation was: Wilbur S. Smith, chairman; Martin E. Bruening; Marble J. Hensley; George W. Howie; Eugene Maier; Leslie J. Sorenson; and T. T. Wiley. The general chairman of the National Committee is E. H. Holmes, and the secretary is William G. Eliot 3d. Committee Chairman Holmes expressed high commendation of the representatives of the organizations who served on the committee.

Publication of the new edition will be undertaken as soon as possible, according to the officers of the committee. The document will be printed by the Government Printing Office, and will be available through the Superintendent of Documents. As soon as information is available on the exact date of availability and the price, full information will be published in the pages of *Traffic Engineering*.

The committee will hold its usual annual meeting in January and at that time will lay the groundwork for research and discussion to answer questions raised by parent organizations in their review of the new manual.

Ramps to be Closed on Atlanta Expressway

Several of the "on and off" ramps on the Atlanta Expressway will be closed next spring. Professor Donald O. Covault of Georgia Tech's Department of Civil Engineering will direct a research project sponsored by the Georgia State Highway Department and the Bureau of Public Roads in which the influence of ramp spacing on traffic flow characteristics on the expressway and associated city streets will be studied. This study will be used to develop criteria for the spacing of interchanges for expressways in urban areas.

A series of studies will be made on the expressway with all interchanges operating as they were designed. Traffic volumes, and speeds, and information about weaving, merging and diverging traffic will be collected and evaluated. Traffic on surface streets which are influenced by the expressway will also be studied.

By closing several ramps during the morning and evening peak hours a second series of studies will be made for approximately two weeks at each interchange. Resulting changes in traffic flow characteristics will be measured on the expressway and surface streets which are influenced by expressway flow. No two ramps will be closed at the same time.

The use of radar to measure speed will be applied to this research. Time-lapse photography, however, will be used for the majority of the traffic data collection analysis. Conventional traffic analysis procedures will also be used where these methods are feasible.

This study is scheduled to be completed by September, 1961.

California Division of Highways Reports Its Functions

The California Division of Highways has recently reported to the legislature on the functions of the department in connection with the operation of the highway plant. The report has been published as "Functions of the Division of Highways in Operating the Highway Plant."

The report was made as a result of a resolution of the 1959 legislature which called for a factual study of state functions bearing on ownership and use of motor vehicles. The study is aimed at helping both the several departments involved and the legislature itself gain a better understanding of purposes, objectives and future responsibilities in the area of growing motor vehicle ownership and use.

The functions included in the study were: driver licensing, accident records, driver education, courts, registration and title, financial responsibility, police, highway operations and public information. The current report of the Division of Highways, of course, is concerned only with accident reports and highway operations.

The report was directed to an interim committee of the California Assembly, headed by the Honorable Lee Backstrand. The committee held hearings, and the picture shows George M. Webb, traffic engineer of the department, appearing before the committee with the attorney for the Division of Highways.

The published report, 76 pages plus appendices, includes the following sections: accident reports, pavement markings, signing, speed zoning, traffic signals and highway lighting, traffic census, general traffic regulations, and permits. Each section discusses the purpose of the function, the origin of the function, its growth, and its accomplishments. Also discussed are the relationships with other departments involving the function, a brief description of the methods used in carrying out the function, and reference to standards which are followed.

Eames Named to Head Federal Register

The appointment of Wendell G. Eames as director of the newly-created National Register of Revoked Operators' Licenses in the Bureau of Public Roads has been announced by Federal Highway Administrator Tallamy. A native of Preston, Idaho, Mr. Eames has had many years of specialized experience in large-scale record-keeping and communications work in the Federal Government.

Public Law 86-660, passed by the last Congress, required the Secretary of Commerce to establish a register containing the names of individuals whose drivers' licenses had been revoked for either or both of two causes: Driving while intoxicated; or violation of a motor vehicle law resulting in the death of a person.

Mr. Tallamy indicated that plans for establishment of the register and its operation would be developed by the BPR Office of Administration in cooperation with state motor vehicle and driver license authorities. The program is voluntary insofar as the states are concerned.

Jaycee Community Development Awards

Alger Malo, Detroit, second from right, President of the Institute of Traffic Engineers, served as one of the five judges for the 1959-60 Jaycee Community Development Program awards of the U. S. Junior Chamber of Commerce. The judges met at Jaycee national headquarters in Tulsa, Okla., to select national winners from notebooks submitted by participating Junior Chambers. From left the judging panel included: William Burchardt, Oklahoma City, editor, OKLAHOMA TODAY MAGAZINE; Hueston Smith, St. Louis, president, Consulting Engineers Council; Gordon Hicks, Tulsa, former U. S. Jaycee executive vice president; Malo and Morgan J. Doughton, Allentown, Pa., president, U. S. Junior Chamber of Commerce for 1960-61. Top awards in the program, co-sponsored by American Motors Corp., went to Downers Grove, Ill., $1,500 first prize; Enfield, Conn., $1,000 second prize; and Chattanooga, Tenn., $500 third prize. Honorable mentions were Washington, D. C., Brandon, Miss., Miami, Okla., Eureka, S. D., and Bellevue, Wash.

"Traffic Pacing" System To be Tried in Michigan

A two-year experiment in facilitating the flow of traffic through "pacing" is to be tried in Macomb County, Michigan. General Motors Research Laboratories and the Macomb County Road Commission have announced the proposed installation of a four-mile system along Mound Road between Eleven and Fifteen Mile Roads in the county.

Dr. Lawrence Oehmke, chairman of the Macomb Board of Road Commissioners, and Dr. Lawrence R. Hafstad, GM vice president in charge of Research Laboratories, said the agreement provides that GM Research will pay for the installation and the road commission will operate it.

Designed by GM Research Laboratories Engineering Mechanics Department, the system is unique in the United States, and during the two-year experimental period both county officials and GM Research engineers hope to gain valuable data on traffic flow and control.

The Traffic Pacer is based on the German version of a "traffic funnel" developed by Dr. Wolfgang von Stein, who served as consultant on the project and last year participated in a traffic symposium sponsored by GM Research Laboratories at GM Technical Center.

Dr. von Stein's system now is extensively used in Dusseldorf and Cologne. Results have included an improvement in traffic handling capacity of about 20 per cent, fewer stops for motorists at red lights and improved safety.

The idea of the system is to concentrate cars proceeding in a traffic lane into groups timed to arrive at intersections during the green interval. This is accomplished by an illuminated speed sign situated just beyond each intersection in the system, advising the motorist how fast he should drive to make the next green light and thus avoid stops.

The indicated speed on the illuminated sign varies according to the position of the car in the group or its time of passing the sign. In addition, the system is designed to be flexible so as to suit the varying traffic conditions which exist during the day. For instance, during the peak traffic periods when people are headed for home or for work, the speed rate may be lowered to permit vehicles to travel closer and closer together. This increases the road's traffic capacity, and although speed may be lowered, the individual driver is likely to gain time by making all the green lights between Eleven and Fifteen Mile Roads.

In the Traffic Pacer system the speed signals and traffic lights are inter-connected and synchronized from one end of the system to the other. The system is expected to be in operation in January or February 1961, and will be observed by traffic, safety and highway engineers from all parts of the country.

Toronto Signal Project Opened to Inspection

A traffic signal research project, described as "the most advanced and powerful yet developed" has been opened to the view of all traffic engineers from across North America.

Toronto's two top traffic administrators made the blanket invitation recently at the annual convention of the Canadian Good Roads Association. Sam Cass, traffic director for Metropolitan Toronto, and Robert Burton, traffic director for the City of Toronto, made the invitation jointly in conjunction with the consulting engineers who helped them design the scheme.

The project is a computer-automated control system that is traffic actuated via radar. In its current test phase, the system is coordinating traffic flows through 16 related intersections in a five square mile area containing several major arterial roads and numerous ordinary streets.

Although final results will not be available until late this year, the results to date are "very encouraging," Mr. Cass and Mr. Burton announced. It was described at the recent ITE meeting in Chicago, where it aroused much interest.

Chief advantage is that the electronic computer system offers virtually no limitations to the flexibility which can be achieved in the way signals are made to respond to vehicle movements. This versatility enables the minute-to-minute "thinking" of traffic signals—not only on the basis of the traffic immediately facing each signal but on the basis of traffic facing a wide network of signals. It is the only system with a built-in ability to sense and clear traffic congestion.

The project is being sponsored jointly by Metropolitan Toronto and the City of Toronto and is being carried out by the Traffic Research Corporation, a division of KCS Limited of Toronto. Leonard Casciato, Chief Engineer of Traffic Research Corporation, confirmed the invitation made by the metro and city traffic directors. He explained that traffic people wishing to see the KCS computer at work on the project would also be able to see the traffic results directly by watching key intersections on closed circuit T.V.

New Products

Rubber Highway Dividers

Pylacon, Inc. of Toledo, Ohio has announced an all new flexible material which has been developed for highway dividers. The new dividers (sometimes called jiggle bars) are extruded from a special butyl polymer compound impregnated throughout with federal yellow. The compound is made to withstand years of abrasion and is highly weather resistant. The standard units weigh approximately eleven pounds each which makes for easy handling and storage.

One of the major advantages is that this material can be supplied in stock lengths (16'), with sufficient anchoring material, which gives the users the opportunity of cutting the material to fit their particular needs. Additional advantages according to the manufacturer, are quick and easy installation; that they can be removed and re-used; and elimination of the necessity of patching the surface after removal. Another point of vital interest to the cold weather areas is the fact that they will not damage snow plows if accidentally struck.

Dividers are anchored to pavement with mushroom head anchor rods or with an epoxy resin material as desired. Complete specifications are available from Pylacon, Inc., 48 N. Westwood Ave., Toledo 7, Ohio.

Computer Programming For Traffic Studies

Recent issues of this magazine have carried a number of articles by Mr. W. L. Mertz, of the Bureau of Public Road's Division of Development (now with the Metropolitan Washington Regional Highway Planning Committee), concerning the use of electronic computers in traffic forecasting and assignment. Mr. Mertz mentioned that the programs used by BPR and a number of highway departments were developed with the cooperation of General Electric Company's Computer Department in Phoenix, Arizona.

This activity has continued to grow in scope at GE and is now being conducted on a consulting basis from the Company's offices in Washington, D.C. The forecasting and assignment programs developed for Bureau of Public Roads are in the BPR Library and are available to anyone wishing to use them. General Electric Company can supply assistance in preparing for such use and performing computer runs, make modifications to the programs if desired by the user, revise the programs which are now written for the IBM 704 for use on other computers, or write new programs for any phase of traffic engineering. An experienced staff of programming and engineering personnel is available for these services.

Inquiries about the programs may be addressed either to the Division of Development, Office of Operations, Bureau of Public Roads, Washington 25, D. C., or directly to General Electric Company, Computer Department, 7401 Wisconsin Avenue, Bethesda 14, Maryland.

McReynolds Firm Moves To Alexandria

Traffic Engineers Supply Corporation has recently moved to its new home at 808-12 North Fairfax Street, Alexandria, Virginia. The announcement of the move was made by Marshall B. McReynolds, president of TESCO.

The new location will permit stocking and immediate delivery of all traffic control products which the firm represents. Located as it is in the Washington metropolitan area, the firm is now in a position to offer 24-hour service and free delivery to customers in a 35-mile radius.

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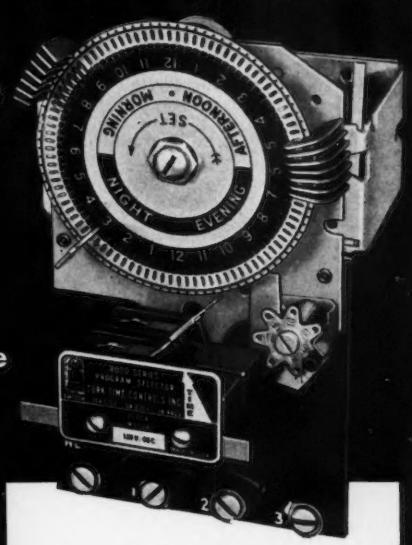

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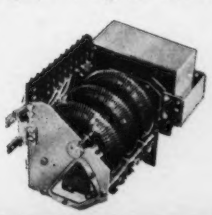

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Award Made by Wald for Maintenance Of Striper

The Traffic Engineering Department of Arlington County, Va., and the operator of the county's "push-button" pavement-marking machine have received a special award from Wald Industries, Inc., of Huntingdon, Pa., for outstanding maintenance of publicly-owned equipment.

The county purchased the first "Town and County" marking machine Wald made, on March 18, 1958. The machine has been in steady use since that time, operated and maintained by Joseph A. Garrison, equipment operator of the Traffic Engineering Department.

Henry Hulme, Arlington Traffic Engineer, said the equipment is used to apply 4-inch white reflective traffic lines to some 60 miles of streets and roads in Arlington County, and that it puts down over 113 miles of centerline, lane line, pedestrian cross-walks and stop bars each year.

It has been so excellently maintained during its more than two years of steady use that only $29.80 has been spent for replacement parts. These were for replacement of gaskets and parts of the high-speed paint spray guns.

The president of Wald Industries, John C. Horn, said that Garrison, who lives at 3502 13th Street, South, Arlington, had kept the marking machine "absolutely spotless—as clean as a pin, inside and out."

"When a municipal government department and one of its employees give better care to publicly-owned equipment than to their own car, they deserve recognition," Horn said. "They deserve the thanks of the manufacturer, who wants his product to deliver the good service it is built to provide, and they deserve the appreciation of the community and taxpayers who foot the bill."

Garrison has been employed by Arlington County since January, 1954, and joined the Traffic Engineering Department in 1958 when the marking machine was obtained. The county has some of the nation's heaviest concentration of traffic, particularly on roads leading into and out of the Pentagon and Washington, D. C. Despite this, its traffic lines are regarded as among the best-maintained in the country.

The county's young traffic engineer, Hulme, is a native of Arlington County, was graduated from Virginia Military Institute in 1954, and joined the county's highway department as a design engineer after his graduation. After a special course at Northwestern University, he became traffic engineer for the county in 1957.

The award for outstanding maintenance is the first ever made by Wald Industries, a leading manufacturer of pavement marking machines and automatic sign shop systems. A later model of the "Town and County" was purchased last fall by the District of Columbia, and is used to mark streets throughout the nation's capital. Similar and larger units are now used by state highway departments and cities throughout the United States and in many foreign countries.

The awards were presented by Maxwell H. Corbin, regional sales manager of the manufacturer.

Displaying certificates of merit awarded to the Arlington County (Va.) Traffic Engineering Department for outstanding maintenance of publicly-owned equipment are, from left: C. G. Stoneburner, highway division director; Maxwell H. Corbin, Wald Industries' regional sales manager; Robert Mathais, supervisor of signs and striping; Joseph A. Garrison, equipment operator, and Henry Hulme, Arlington traffic engineer.

New York to Try Electronic Control

Electronic control of New York's traffic signals by means of a radio communications system will undergo intensive testing for a year, Traffic Commissioner T. T. Wiley has announced.

The system, which is designed to reduce traffic delays by providing centralized signal control and synchronization and greater operational flexibility will start operations on a heavily traveled four-mile stretch of Conduit Boulevard between 225th Street and Cohancy Street (about 100th Street) in Queens. This service road of the Belt Parkway handles 60,000 vehicles daily. Later installations will be made at various locations throughout the city to determine feasibility under different conditions.

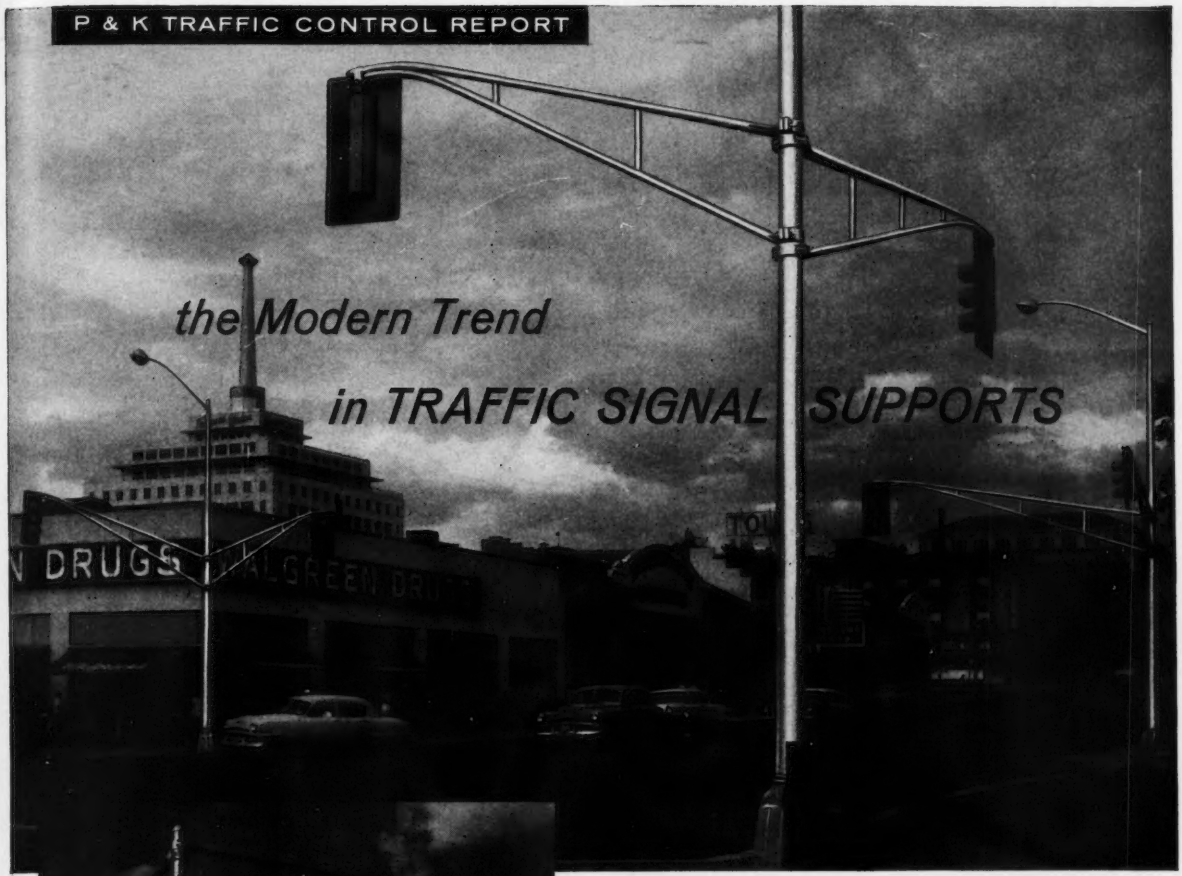
Changes in signal timing at the vast majority of the city's 8,000 signalized intersections are presently made by individual adjustments at each control box thereby making programmed or instantaneous emergency changes impractical. Signal interconnection, to permit timing schedule maintenance and synchronization of staggered light systems, has up to now been made by laying cable between signals. This is an expensive method and causes disruption of traffic as a result of excavating the cable trench. The cost of installing the present system is approximately $50,000 per mile. The radio system will reduce this figure to about $15,000 per mile and make it unnecessary to dig up the streets.

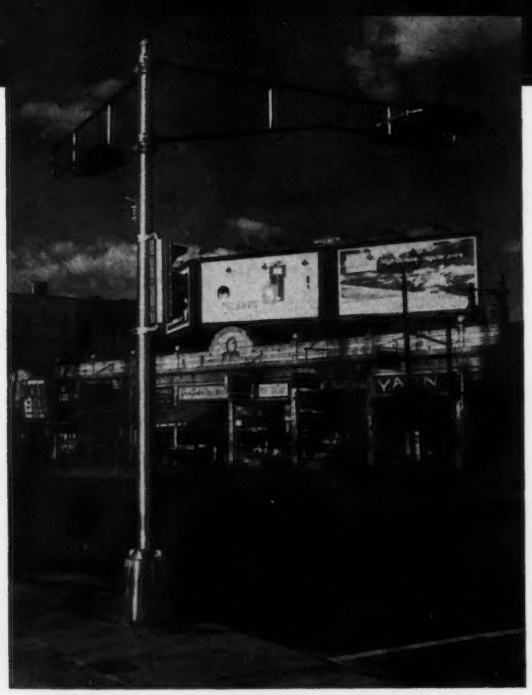
"The radio control system will permit broader application of progressive (staggered) signal timing and greater flexibility of operation by enabling signals to be changed from a central location without sending personnel to the site. It will also permit us to expedite rush hour traffic by favoring in-bound in the morning and out-bound in the evening as well as making parallel routes available in case of traffic tieups, emergencies or detours," Commissioner Wiley stated.

Under the new system, the central controller can put 18 different types of programs or schedules into effect, each within an interval of not more than 12 seconds, by means of a punch-card reading device. This is the first such punch card control system ever installed.

The cards, representing a "program" for a particular street system, are fed

P & K TRAFFIC CONTROL REPORT





TOP PHOTO: Denver, Colo.; Combination lighting & traffic signal mast arm standards.

BOTTOM PHOTO: Orange, N. J.; Twin trombone arm traffic type standard.

P&K ALL ALUMINUM MAST ARM AND TROMBONE ARM TRAFFIC SIGNAL STANDARDS

Gone are the overhead span wires . . . now bright, modern P&K aluminum traffic standards mount the signal heads and control traffic over some of the widest intersections. Naturally, as the oldest firm in the industry, striving constantly for improvements, P&K is responsible for so many new developments. Some of the recent ones include the new 30 ft. truss mast arm . . . the new extra-heavy standards that mount traffic signals, pedestrian signals, and street lighting luminaires as well. Whether you have to control 2 lanes or 4 lanes or 6 lanes, you'll find that P&K makes the standards and arms that will exactly meet your requirements. Designed to eliminate superfluous parts, P&K truss type standards speed installation and reduce inventory. What's more, they never require painting . . . virtually end expensive maintenance.

For more budget saving facts, write for Brochure TE-1.

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into equipment which translates the pattern of perforations into coded electronic impulses. Routed by telephone cable to an unattended FM radio transmitter on the roof of the Queens General Hospital, the impulses are broadcast as ultra high frequency signals. At a street intersection the receiver-decoder, mounted on the signal pole, controls the traffic light according to the instructions received. It responds only to broadcast signals coded for the particular location. Each card in a "program" controls one or more traffic signals. Punching on the cards represents both the location of the signal and the predetermined instructions for the functioning of the light.

A system of lights may have several "programs" keyed to changes in traffic flow characteristics at different hours of the day. Thus, heavy in-bound traffic may be favored in the morning and heavy out-bound in the evening. Changes in the character of vehicular flow, such that occur in midtown Manhattan where the heaviest direction of traffic is north-south during the day and after 7 P.M., east-west, can also be accommodated by the new system.

The city-wide plan envisions a transmitter station in each borough which will receive messages from the master controller to be located at Traffic Department Headquarters, 100 Gold Street, Manhattan. The first transmitting station has been established at Queens General Hospital on 164th Street near Hillside Avenue.

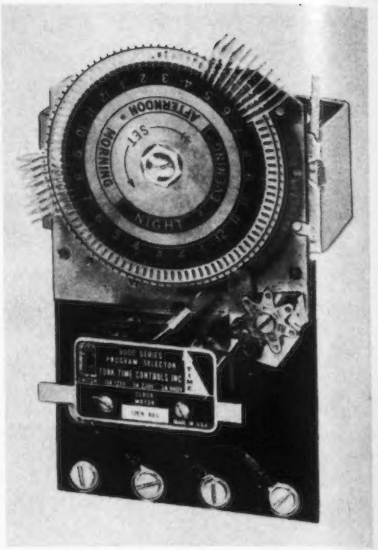
FM station KEH-307 has been assigned by the F.C.C. to the department for broadcasting the coded signal control instructions. Electronic equipment installed at 100 Gold Street can control 1,000 separate locations. It also has means for manually interrupting or resetting a "program." Simultaneously with control instructions the system broadcasts synchronizing signals which keep traffic signals operating in proper sequence.

The radio control system was built by Motorola Communications and Electronics, Inc., Chicago, Ill. according to Traffic Department specifications at a cost of $125,699.

Time Switch for Traffic Signal Controllers

A new one-dial/three-circuit time switch, developed expressly for traffic signal controllers, has been announced by Tork Time Controls, Inc. The one-dial unit will assure greater safety and accuracy for it eliminates the danger of the wrong controller being energized (due to improper synchronization) when two or more time switches are used, according to the manufacturer.

It also makes for simpler and more accurate field installation and saves space and considerable cost over the old conventional multiple time switch setup. Called the Model #8077SK, it is ideal for the replacement of older and obsolete type units as well as for new installations. Old equipment need not be altered; the unit's mounting



plates fit the standard mounting switch holes on all makes of traffic controllers.

Here's how the one dial, controlling 3 individual circuits, serves to replace separate switches for daily system dial selection:

Circuit #1: normally energized, controls 'controller dial #1' for normal daytime and nighttime operation.

Circuit #2: switches to 'controller dial #2' for 'morning in-bound'.

Circuit #3: switches to 'controller dial #3' for 'evening out-bound.'

The full day's program is set but once on the one 24-hour dial, accurately, with the special tabs on the dial. As one circuit is switched "off" the next is instantly energized and the proper traffic controller dial placed in service.

From 1 to 48 individual operations per day, in 15-minute increments, may be programmed with the tabs. The special tabs eliminate both the need to slide ON-OFF tripper manually and the danger of the trippers working loose from the dial.

A "skip" feature enables keeping either or both Circuits #2 and #3 off on weekends or any selected days of the week. The 8077SK is also available with Tork's 20-Hour Reserve Power, to insure continued operation in the event of power failures. When power is restored, traffic controls are back in "on time" operation without need for dispatching service crews to reset.

Descriptive literature and further information on the 8077SK is available, gratis, from: Traffic Control Div., Tork Time Controls, Inc., Mount Vernon, New York.

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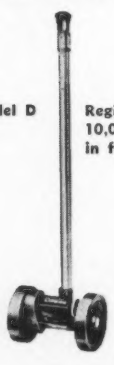

Model D — **Registers up to 10,000 ft. in feet & inches.**

Direct Reading • No Bells • No Counting
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Special for the TRAFFIC ENGINEER:
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The Shalda Measure Meter has been put to practical use by traffic engineers all over the nation. Its simplicity and accuracy has proven tremendously valuable in traffic engineering and has been accepted as a useful and practical tool.

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No other machine has this feature.

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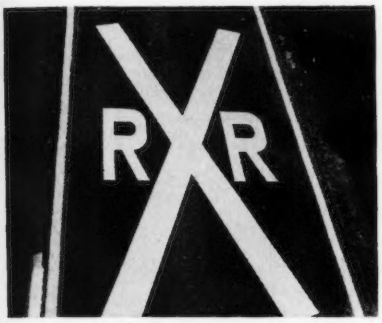
Ohio Uses Prismo At RR-Xings

A major program of marking dangerous railroad grade crossings in Ohio with permanent-type white, reflectorized Plastix "RR" legends and "Stop" bars has been inaugurated by the Department of Highways following successful test applications of the new legends at two crossings. The announcement was made by James V. Musick, Traffic Engineer, and William H. McLaughlin, Technician of the Traffic Engineering Department.



Initial attention will be concentrated on installing the Plastix legends at 110 grade crossings with bad accident histories, officials of the Highway Department's Bureau of Traffic said. In addition to protection of the two crossings, the department has installed a total of 28 "Turn" arrows and 22 "Stop" bars at eleven busy intersections.

"All eleven of these intersections have severe traffic where paint cannot stand the gaff," the traffic official said. "We are having excellent success with the material (Plastix). Its durability, freedom from 'creep' and ease of installation under traffic make it ideal.

The special railroad crossing legends are applied directly to the pavement, in the right lane. Distance from legend to railroad tracks is determined by a special formula, as is the placement of a "Stop" bar, also of Plastix, located between the legend and the tracks.

The special program for grade-crossing protection was developed as the result of legislation enacted by the 102nd General Assembly of the Ohio Legislature, and a report submitted to the Legislature in 1959. The report, based on extensive study, set forth that Ohio had 10,852 grade crossings of public highways, of which 2,752 were protected and 8,127 were unprotected. The crossings accommodated 13,731,830 vehicular crossings and 138,536 train crossing movements per average week day.

The survey also pointed out that the greatest returns in increased safety for dollar volume of investment could be realized in the fields of warning devices and improved sight distances.

Use of the permanent-type Plastix for legends and stop bars has been recommended in view of the long life of the material, which stands up under traffic and weather for years. Coated with a special adhesive, the Plastix adheres immediately to the surface of the highway, and under traffic quickly becomes almost an integral part of the pavement, standing up with little wear under cinders, salt and even snow plows.

Compact Electronic System Developed

An electronic detector system for the nation's highways, operating from circuits embedded in the pavement to control traffic automatically or to count passing vehicles, was announced by the Radio Corporation of America.

Designed for use near busy intersections, the system can be used to operate signal lights in keeping with the changing flow of traffic and to record the passage and speed of vehicles, according to T. A. Smith, Executive Vice President, RCA Industrial Electronic Products.

Mr. Smith said the system, named RCA Ve-Det (Vehicle Detector), is an immediate application of the techniques used in the electronic highway system developed at RCA's David Sarnoff Research Center in Princeton, N.J.

In a recent demonstration at the Center, two specially equipped automobiles were put on "automatic pilot," with an electronic system controlling starts, stops, proximity to other vehicles and traffic signals.

The demonstration combined RCA electronic vehicle detection and guidance equipment with car control devices developed by the General Motors Research Laboratories to respond to signals from road circuits.

The all-transistor RCA Ve-Det system employs a wire loop buried in the roadway surface. When a vehicle passes over this loop, a signal is received by the portable detector, a unit measuring only 4 by 5 by 7 inches, which can be moved to any wire loop installation in a highway system. Two detectors can operate from the same dimensions as the detector itself.

One detector will cover any selected road lane. Mass detection across as many as eight lanes is possible by use of a special loop design. Two detectors operating from a common power supply unit provide separate coverage of two adjacent lanes.

The detector may be connected with a counting device, traffic signal controller, traffic warning light, turnpike toll booth indicator, or to an automatic garage door opener.

Because the wire loop is buried in the roadway, Mr. Smith said, dependable operation of a traffic signal, for example, is assured under all weather conditions. The detector is effective in keeping tabs on vehicles operated at speeds ranging from two to 200 miles an hour.

As a traffic counter, the Ve-Det notes vehicles rather than the number of axles passing by, improving the reliability of the count.

Kerrigan Offers Two New Catalogs

Two new catalogs are now available from Kerrigan Iron Works Company, P. O. Box 479, Nashville, Tennessee. The new books are (1) Octagonal Tapered Steel and Aluminum Lighting Standards, and (2) Round Tapered Aluminum Lighting Standards.

Included in these two catalogs are new designs in both street and area lighting standard equipment, with a good variety of arms to meet almost any lighting problem. Traffic signal standards, brackets and mast arms for wood, metal pole and wall mountings are included in the Round Aluminum catalog.

Both catalogs are available upon request to the manufacturer.

Wheeler Reflector Co. Introduces New Product

A new side-mounted Crescent Reflector, which eliminates entirely the need for head inventory while also reducing reflector inventory, is now being introduced by its manufacturer, Wheeler Reflector Company, Division of Franklin Research and Development Corp., Hanson, Massachusetts.

Wheeler's new Crescent Reflector includes the added features of being low in price, with easy installation and is made for a 2500 lumen output lamp. It is of modern design, made of steel with a porcelain enamel finish, and is also available in aluminum. The

Crescent Reflector has a photocontrol receptacle in the slipfitter, and it can be pre-wired with or without the receptacle. A special knockout plug allows insertion of the receptacle after installation.

For further details on this new side-mounted Crescent Reflector, write to Street Lighting Dept., Wheeler Reflector Company, Division of Franklin Research and Development Corp., Hanson, Massachusetts.

Ice Control Film Offered by Dow

"Highway Ice Control," a 16-mm color and sound motion picture, has been released by The Dow Chemical Company, Midland, Michigan.

The 12-minute film points up the advantages to be gained from using calcium chloride-sodium chloride mixtures. It shows current methods used by turnpike engineers who pioneered the use of chemical mixtures for winter road maintenance. It features bulk handling and application of chemical de-icers for more efficient operations.

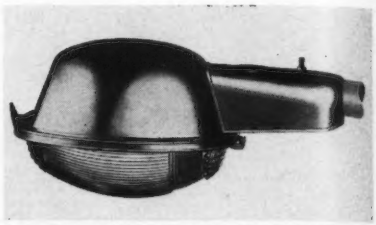
Suitable for showing to highway engineers and to service clubs interested in the problems of winter highway maintenance, the motion picture is available on a loan basis from Dow Sales Offices or from Dow's Highway and Construction Materials department, in Midland.

Revere Offers New Luminaire for Residential Areas

Revere Electric Mfg. Co., announces the new 2500 Series "Urbanoval" end-mounting street lighting luminaire for residential areas or secondary streets where uniform, low-level lighting is desired.

The Urbanoval is designed for 100, 175, or 250-watt mercury lamps or incandescent lamps up to 4,000 lumens. It is the latest addition to a new "family" of Revere luminaires engineered to meet the varied requirements of different street lighting applications. The smallest in the Revere family of end-mounted oval mercury luminaires, the Urbanoval provides efficient, low cost lighting. A choice of two Revere-Corning Pyrex® refractors provides A.S.A.-I.E.S. Type II or Type II—4-way distribution patterns with clear lamps, or Type III or 4-way distribution with phosphor-coated mercury lamps.

The Revere Urbanoval is available with choice of 1¼" or 2" slipfitter. For complete information, request Urbanoval Bulletin from Revere Electric Mfg. Co., 7420 Lehigh Ave., Chicago 48, Ill.



LOW COST REVERE "URBANOVAL" LUMINAIRE uses highly efficient low-wattage mercury lamps to provide economical, uniform, low-level lighting for residential areas or secondary streets. It is offered with or without locking-type receptacle for E.E.I.-NEMA standard plug-in photoelectric control. Choice of refractors and lamp types provides distribution pattern desired.

The major looked up from his desk at the first class private and snapped: "Now really, I ask you, in civilian life would you come to me with a puny complaint like this?"

"No sir," was the reply, "I'd send for you."

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THE TRAFICOUNTER, JR.
is a simple, sturdy, time-tested device for traffic counting. It is pneumatically actuated by means of the road tube attachment.
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New Publications

Freeways and Parking

Transportation Institute, University of Michigan, Ann Arbor and Automotive Safety Foundation, 200 Ring Building, Washington 6, D. C. Sept. 1960. 15 pp.

The result of the Workshop Conference on Coordination of Expressways and Parking in Ann Arbor, this booklet relates the broad consideration of providing parking in conjunction with freeways.

In the foreword, John C. Kohl, Director of the Transportation Institute says: "Current improvement programs are bringing into sharper focus the close relationship between high-capacity expressways, or freeways, and terminal facilities. To provide a complete transportation service, even the most modern highways must be complemented with adequate parking. It is essential to develop them together if both economy and quality of service are to be realized."

The Community, The Motorist, The Freeway, Integration of Transit and the Parking Facility are the five areas discussed.

Traffic Origin and Destination Studies: Appraisal of Methods

Bulletin 253, Highway Research Board, 21201 Constitution Avenue, Washington 25, D. C. July 1960. 188 pp. $3.80.

Included in this bulletin are the text of a panel discussion on inter-area travel formulas and eleven papers on appraisal of traffic study methods, presented at the 39th Annual Meeting of the Highway Research Board, as follows:

"Estimating Efficient Spacing for Arterials and Expressways," by Roger L. Creighton, Irving Hoch, Morton Schneider, and Hyman Joseph.

"Generation of Person Trips by Areas Within the Central Business District," by B. C. S. Harper and H. M. Edwards.

"Tests of Interactance Formulas Derived from O-D Data," by F. Houston Wynn and C. Eric Linder.

"Interpretation of Desire Line Charts Made on a Cartographatron," by J. Douglas Carroll, Jr., and Garred P. Jones.

"The Continuing Traffic Study: Methods of Keeping O-D Data Up-to-Date," by Albert J. Mayer and Robert B. Smock.

"Appraisal of Sample Size Based on Phoenix O-D Survey Data," by Arthur B. Sosslau and Glenn E. Brokke.

"Panel Discussion on Inter-Area Travel Formulas," by John T. Lynch, Glenn E. Brokke, Alan M. Voorhees, and Morton Schneider.

"Multiple Screenline Study to Determine Statewide Traffic Patterns," by Mark K. Green.

"Land Use Forecasting for Transportation Planning," by Walter G. Hansen.

"New York Port Authority's 1958 O-D Survey Using Continuous Sampling," by Warren B. Lovejoy.

"A Theoretical Prediction of Work-Trip Patterns," by Robert T. Howe.

"Critique of Home-Interview Type O-D Surveys in Urban Areas," by Nathan Cherniack.

Proceedings, Western Section, ITE

13th Annual Meeting (July 1960, San Francisco), Western Section, Institute of Traffic Engineers, edited by Wolfgang S. Homburger, c/o ITTE, 1301 S. 46th Street, Richmond, California. October 1960. 107 pp., lithoptd. $3.00 postpaid.

These Proceedings contain twenty papers and one panel discussion presented at the July 1960 meeting of the Western Section of the Institute of Traffic Engineers, held in San Francisco. The following is the table of contents:

Professional Status—Traffic or Transportation Engineer, by Charles E. DeLeuw and William R. McConochie.

The Transportation Engineer's Role in Community Development, by M. M. Webber.

Speed Zoning—Selective or Blanket? A Panel Discussion.

Traffic Controls for Special Events at the Los Angeles Coliseum, by G. W. Skiles.

Checkback on 'Operation Candlestick', by Ross T. Shoaf.

Century 21 Exposition, by Bruce R. Culver.

Improving Freeway Operation, by Charles J. Keese.

Shopping Center Traffic Design, by G. R. Cysewski.

Efficient Movement of Goods in the Central Business District, by E. M. Horwood.

Pedestrian Malls, by Paul S. Robinette.

Modern Rapid Transit for the Los Angeles Area, by Irvan F. Mendenhall.

Bus Rapid Transit—St. Louis Area Plan, by R. Gilman Smith.

Warrants for Exclusive Bus Lanes, by W. H. Carsten.

A Theory of Traffic Flow on Urban Streets, by James H. Kell.

Motor Transport Operating Characteristics, by Roy B. Sawhill.

The Driving Simulator, by Slade F. Hulbert.

Traffic Distribution Forecasts—Highway and Transit, by Henry D. Quinby.

Advance Warning Signals Under Fog Conditions, by Earle W. Taylor.

Landscaped Structures for Traffic Regulation in Residential Neighborhoods, by Martin A. Wallen.

Effectiveness of Ramp Closure During Peak Hours, by Richard J. Carlson.

Traffic Planning for the Central Business District Mall, by Leslie M. Frink.

Positions Available

SPOKANE, WASHINGTON

Position: Traffic Engineer I.
Requirements: Engineering degree with courses or experience in traffic engineering field. Satisfactory traffic engineering experience may be accepted in lieu of degree.
Salary: $5,568 to $6,720.
Starting salary dependent upon qualifications. Overall salary range expected to increase July, 1961.
Apply: E. J. Leland, City Traffic Engineer, 411 City Hall, Spokane, Washington.

NEW YORK STATE DEPT. OF PUBLIC WORKS

Position: Senior Civil Engineer (Highway Planning)—The New York State Department of Public Works has 15 vacancies.
Salary: $7,818 to $9,408.
Requirements: New York State residence is *not* required. Requires license to practice professional engineering in New York State *or* in state or territory where candidate resides or has place of business and two years of satisfactory professional civil engineering experience. Civil Service examination on January 21, 1961.
Apply: Recruitment Unit, Box 72B, New York State Department of Civil Service, The State Campus, Albany 1, New York.

CONSULTANT, ONTARIO

Position: Traffic Engineer.
Salary: Open, all fringe benefits.
Requirements: Sufficient for Associate Membership in I.T.E. Experience in transportation studies, urban planning, and highway design preferred.
Location: Work in Canada. Head Office in Hamilton.
Apply: C. C. Parker & Parsons, Brinckerhoff Ltd., 795 Main Street West, Hamilton, Ontario, or 165 Broadway, New York 6, N. Y.

(Continued on page 52)

New Appointments

McCracken is Promoted By Liberty Mutual

Vice President Dwight M. McCracken has been named general manager of the Liberty Mutual Insurance Company's loss prevention department with headquarters in the Boston home office. He was formerly manager of the motor transport department. He succeeds William H. Seymour, retired.

A native of Muskegon, Mich. and educated at U.C.L.A., Boston University and Harvard, McCracken joined the company in 1935 as a highway safety supervisor for the loss prevention department. In 1939 he was named director of the Traffic and Safety Bureau and in 1945 became manager of the motor transport department. He was appointed an assistant vice president in 1949 and a vice president in 1958.

He is a member of the Coast Guard Shield Club; the Naval Order of the U. S.; the Executive Committee, Accident Prevention Division, City of Boston Cab Association; the National Advisory Committee on Fleet Supervisor Training; the Institute of Traffic Engineers; the executive committee and board of governors, Insurance Institute for Highway Safety, and the board of directors, Transportation Association of America.

Pollard to Head Memphis Office

William S. Pollard, Jr., partner in the firm of Harland Bartholomew and Associates, has been named the resident director of a new office of the firm in Memphis.

Mr. Pollard's background includes two years of Civil Engineering teaching at Purdue University and six years of Civil Engineering teaching at the University of Illinois. Mr. Pollard has been with this firm for approximately six years, of which time he has been a partner for three years. His primary areas of responsibility are, and will continue to be, the fields of traffic engineering, highway engineering, and engineering design as they relate to the general practice of the firm. His largest current responsibility is that of the design of approximately 60 miles of urban interstate highways in Memphis and Shelby County, Tennessee.

Keith Named Engineer to New Transit Agency

The National Capital Transportation Agency has appointed Robert A. Keith (Assoc. Mem. ITE) as Director of the Division of Engineering Programs in the Agency. Mr. Keith is the first appointee to the technical staff and will be Acting Director of the Technical Staff.

Created by Act of Congress in July 1960, the Transportation Agency is charged with planning a modern transportation system for the Washington metropolitan area and with developing the express transit facilities needed in the overall system. The Agency will be located at 726 Jackson Place, N. W., Washington 25, D. C.

In his new position, Mr. Keith will direct the engineering phase of the Agency's analysis on methods of building, financing and administering a network of subways and express buses and how the transit program should be integrated with the highway program. The engineering work will be coordinated with the work of the Division of Area Development Studies, which is to be responsible for various urban planning and land economics analyses.

An initial appropriation (until next July) of $250,000 and a staff of 25 were authorized to begin preparation of a report as well as to lay the groundwork for a land acquisition and minor construction program that will likely get underway in 1961. The report will be presented to the President in November 1962, and the Congress will be asked at that time to approve a specific method for the Federal government, in cooperation with local area governments, of developing a regional transit system.

For the past four years, Keith has been with the National Capital Plan-

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Use SAFE-T-CONES wherever traffic is difficult. Proven and accepted by Federal, State and Municipal traffic authorities in hundreds of major cities.
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28-inch
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12-inch
Solid-color PVC Poly-Cones available in 18-inch and 28-inch sizes.
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ning Commission as Traffic Planning Engineer and at the same time has been on the staff of the Mass Transportation Survey, culminating in the assignment as Project Director in the last year of the study.

A civil engineering graduate of the University of New Hampshire in 1949, Keith completed the Yale course in 1952. He is a registered professional in New York, New Jersey, Connecticut and Florida and is a Member of A.S.C.E.

Wolf Named to Head Cornell Crash Injury Work

Robert A. Wolf has been named director of the Cornell University Crash Injury Research program.

Mr. Wolf is presently a member of the technical staff of Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. He is head of the Laboratory's Operations Research Department and will retain policy guidance of this group.

Mr. Wolf received his Masters Degree in Aeronautical Engineering from the University of Michigan in 1932. He then spent approximately twenty years as an aeronautical design engineer. Upon joining Cornell Aeronautical Laboratory in 1951, he became an operations research specialist and dealt primarily with the analysis of systems problems for the Armed Forces.

Cornell University's Automotive Crash Injury Research program was initiated in 1953 under the direction of Hugh de Haven and later directed by John O. Moore. The program involves the statistical analysis of automobile accidents in order to determine the nature of passenger injuries and their relation to automotive design and accident configuration. Since its beginning, the program has studied almost 40,000 automobile accidents with data collected from nineteen states and five cities across the United States through cooperation of law enforcement, public health and medical agencies. The program is supported by the National Institutes of Health of the U. S. Public Health Service; the Automobile Manufacturers Association; and the Office of the Surgeon General, Department of the Army, through the Commission on Accidental Trauma of the Armed Forces Epidemiological Board.

Merwyn A. Kraft, who has been acting director of the program, will continue his affiliation with the program in addition to his major responsibilities as Research Coordinator of the Flight Safety Foundation and Acting Director of Aviation Crash Injury Research.

Title Changes

Robert S. Holmes—is now Manager, Highway Construction Marketing with the U. S. Steel Corporation in Pittsburgh, Pennsylvania; was Assistant Manager.

Dwight M. McCracken—is now Vice President, General Manager Loss Prevention with Liberty Mutual Insurance Company in Boston, Mass.; was Vice President, Manager Motor Transport & Traffic Safety.

Job Changes

George W. Bloome—formerly Traffic Engineer in the Department of Traffic & Transit of DeLeuw, Cather & Company in Chicago, Illinois; is now Transportation Planner in the Planning Division of the Port of New York Authority in New York City.

Irving K. Chann—formerly Traffic Engineer with Parsons, Brinckerhoff, Quade and Douglas in New York City; is now an Associate Engineer with Wilbur Smith & Associates in New Haven, Connecticut.

Robert E. Sheridan, Jr. — formerly Traffic Engineer with the Traffic Engineering Department of the City of Spokane, Washington; is now Traffic Engineer with the Traffic Control Division of Electronic Industries Imports Pty. Ltd. in Melbourne, Victoria, Australia.

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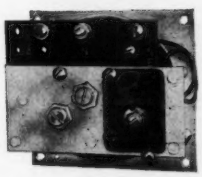

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Model 37 Jack-mounted
Available with or without meter base and cover, as shown, 1 or 2 circuits

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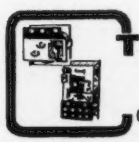

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Flashing Stop Signs

Technical Notes

IMPROVED SIGNAL HEAD MOUNTINGS

By J. F. Williamson, Jr.
Manager, Traffic Signals, Inc.

The traffic control industry is constantly striving for improvement in equipment in order to improve traffic control, increase traffic signal efficiency, reduce accidents, and cut costs in installation and maintenance of traffic signals.

One part of the equipment used in traffic signals and traffic signal controls has remained virtually unchanged throughout the entire 35-year history of the traffic signal industry—the use of pipe for mounting signal heads.

The mounting of traffic heads would be substantially improved, in the opinion of the author, with the replacement of pipe fittings by "tri-stud" fittings. Developed originally by Southern Switch and Signal, a forerunner of Southern Signals, and Traffic Signals, Inc., these fittings are used by almost all of the major signal companies between sections of the head on certain model signals. Their use for mounting the entire signal head would offer even more advantages to the industry.

Why Pipe Was Originally Used

Pipe was originally used to mount signal heads because of the following two reasons:

1. Pipe could be easily cut to length and standard fittings were readily available.

2. Pipe was convenient to work with since maintenance men could use relatively simple tools such as pipe wrenches.

At present, the pipe bracket is attached to the signal head with a 1½" pipe nipple and lock nut. This method of mounting has changed little down through the years. Something else that has changed little down through the years in regard to the pipe mounting is that it is difficult to tighten the lock nut because the pipe wrench often requires more room to work in than is available. This results in maintenance and installation men using such tools as a hammer and chisel to tighten the nut. Some manufacturers have taken steps to help correct this problem by supplying special wrenches that are easier to work with in the restricted space usually available.

Disadvantages of Pipe Mounting

There are several inherent disadvantages in pipe mounting. These are as follows:

1. As mentioned earlier, it is difficult to tighten the lock nut due to the closeness of space.

2. It is difficult to keep the signal aligned when tightening the lock nut. This is due to the contact between the signal and the nut which causes the signal to turn as the nut is tightened.

3. Vibration will often loosen the lock nut and thereby allow the signal to turn.

4. The pipe and pipe fittings are not rustproof as are almost all other parts of the signal.

5. Pipe brackets are extremely heavy, thereby adding to the cost of supporting poles, guys, etc., besides being bulky and difficult to handle.

6. Joints and fittings twist also adding to the difficulty of keeping signals aligned and neat appearing.

Overcoming Disadvantages of Pipe Mountings

The traffic signal industry has been working towards overcoming these disadvantages of pipe mountings. One example of this is the special wrench supplied for tightening the lock nuts that was mentioned earlier.

Another attempt at solving the problem connected with the pipe mounting was the development of the serrated (shur-lock) fitting used to provide a firmer connection between the mounting bracket and the signal head. This helped reduce the problem of twisting the signal out of alignment when tightening the lock nut. However, it still does not eliminate the cause of the trouble, that is, the pipe lock nut that cannot be effectively tightened.

Another approach to solving the problem of the lock nut loosening has been tried by some manufacturers who have used a set screw that runs crosswise of the nut and into the aluminum of the signal head. However, the aluminum does not have the holding qualities of many other metals, which still allows the set screw to work loose. Once the set screw has worked loose, a signal head is back to the basic shortcomings of the lock nut.

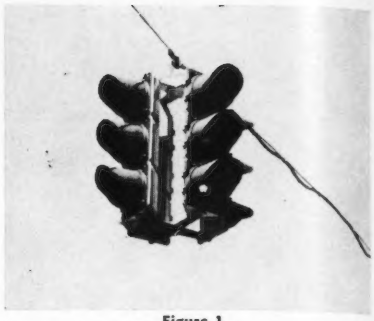


Figure 1
Signal with tri-stud fittings, showing proper alignment.

Use of Tri-stud Fittings

"Tri-stud" fittings for signal heads provide many advantages over the pipe fittings and also represent several significant steps in the advancement of traffic signals generally. Some of the reasons for using "tri-stud" fittings are as follows:

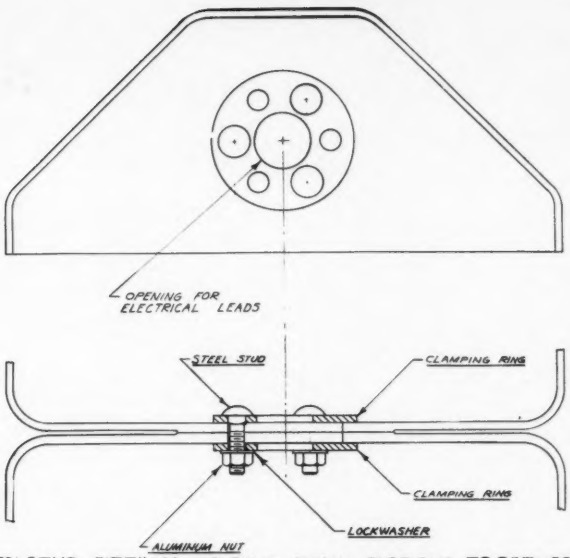
1. Easier to work with, no special tools are required and the three nuts can be easily tightened by a small standard hand wrench that will fit in the close area of a traffic signal.

2. The large bearing surface of the two clamping rings means a sturdier signal where the mounting bracket and signal are held together. This large bearing surface eliminates the problem of the aluminum section breaking away from between the two lock nuts in a pipe mounting.

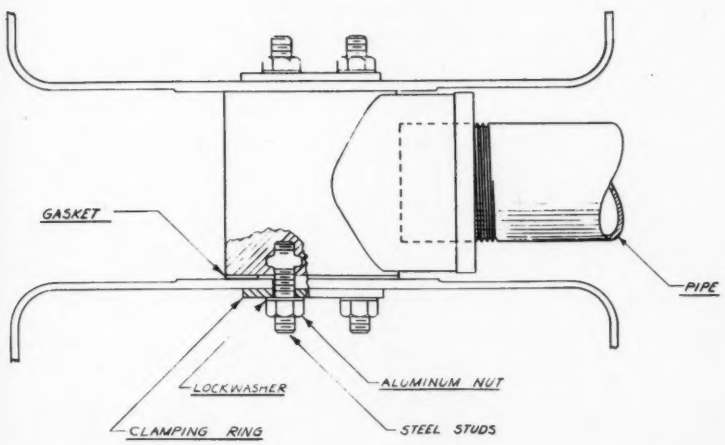
3. Signals are adjustable to an infinite degree of accuracy which is in keeping with the industry's trend towards a narrower beam width. This infinite degree of adjustability is a definite advantage over the shur-lock fittings which have to be adjusted in 5° steps due to the serrations.

4. It is also easy to adjust the signals as finger pressure will tighten the "tri-stud" fittings sufficiently to hold the signal in place. Tightening the "tri-

Figure 2
Twisted signal, frequently experienced with pipe fittings.



TRI-STUD FITTINGS HOLDING SIGNAL SECTIONS TOGETHER



TRI-STUD ELBOW BETWEEN TRAFFIC SIGNAL AND PEDESTRIAN SIGNAL

stud" fitting does not tend to move the signal head because the sections are held firmly between the two clamping rings that cannot turn.

5. A sure, tight fit is obtained that cannot vibrate loose because each nut is tightened down using a lockwasher.

6. Even if the nuts are tightened too much the bracket will not be harmed because the threads on the aluminum nuts will strip without damaging the threads on the steel studs.

7. "Tri-stud" fittings give a straighter, neater signal that is more professional looking than pipe-mounted signals that often tilt or hang crookedly.

8. Nuts on "tri-stud" fittings can be loosened and retightened with no problem.

9. The top section on the signal head is completely water-proofed through the use of a gasket with the "tri-stud" fitting.

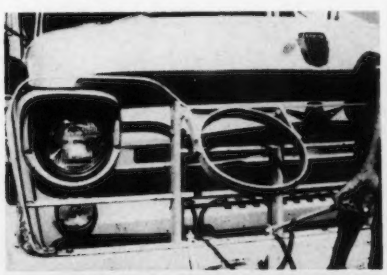
10. The "tri-stud" fitting facilitates use of background shields because the lip of the shield will easily fit under the mounting bracket. This means no drilling is required in the signal sections.

An important thing to remember is that this is not a new, unproven idea. "Tri-stud" fittings have been in use in the traffic signal industry for many years holding sections together in thousands of installations. Almost all major signal companies have gone to the use of "tri-stud" fittings between sections. The "tri-stud" fitting has proven successful between sections—it is the author's belief that the "tri-stud" fitting will prove just as successful for mounting the entire signal head, thereby eliminating pipe fittings.

Figure 3
Tri-stud fitting showing clamping rings, studs, lock washer and aluminum nut.

Folding Traffic-Cone Rack

The photos show one solution to the problem of how to keep traffic cones easily available during maintenance work. The rack, made up of scrap metal, is positioned so that a stack of cones will not obstruct the driver's view. When not in use it folds out of the way but is still high enough to permit the truck to push other vehicles. *(Photos and story courtesy Texas Highway Department)*



Technical Council News

THE TECHNICAL DEVELOPMENT AND RESEARCH FUND

The affirmative action of the membership to revise the By-Laws has started a new phase of Institute operation by creating the Technical Development and Research Fund.

As stated in the By-Laws the objective of the Fund is "to enable the Institute of Traffic Engineers to conduct and coordinate the research and development needed to produce standards, specifications, warrants, recommended practices and other aids to the profession." In doing this the Fund may be used to support, alone or in cooperation with others, research projects which are within the objective. This research may be a complete project, or it may be only a special phase or item of a larger project.

Initially it is expected that the largest source of proposals for using this newly available money will be the members of the Technical Council. This does not, however, preclude the membership at large from making proposals for projects which they feel fall within the objectives of the Fund. At present only about $2,500 to $3,000 a year will be available for research sponsored by the Fund. Nevertheless, when the ability to use these funds wisely is demonstrated, there is every indication that additional monies will become available.

The next question is "how are ideas for projects to be presented?" "How are these proposals reviewed to determine the projects for which support will be considered by the Board of Direction?"

The answer to these questions is found in the functions of the "Review Committee" which has been appointed as provided in the By-Laws. As its first official act, the Review Committee will this month develop a format which all proposals for funds will follow. In this way every proposal will start as an easy-to-review document similar in content to all the others. This "proposal form," which will be published in *Traffic Engineering* as soon as it is available, will require the presentation of enough information to permit the committee to make an objective evaluation of the project.

Once a standard proposal form is adopted the Review Committee will be able to proceed with its primary function—that of reviewing proposals. In doing this each proposed project will be compared with those being undertaken by other agencies to avoid needless duplication of effort. An estimate will also be made of the value of the project in light of the objective of the Fund.

When a proposed project has passed the previous two tests it will be assigned a priority in the scale of needed research within the profession. The funds available will then be matched against the priority of the project and a list developed of the projects for which funds should be provided.

This list will be presented by the Review Committee to the Technical Council for study. The Council in turn will make recommendations to the Board of Direction and the latter group will undertake the actual allocation of funds.

The members of the Review Committee are Thomas J. Seburn, Chairman, Paul L. Green, George W. Howie, Armand E. Keeley and C. F. McCormack.

Contributions to the Fund are accepted at the discretion of the Board of Direction from any individual, firm, association, corporation, agency or other group which wishes to promote and support technical research and development of the art and science of traffic engineering.

POSITIONS AVAILABLE

(Continued from page 47)

CITY OF CHATTANOOGA, TENN.

Position: Assistant Traffic Engineer.
Salary: $485-$610 per month.
Starting rate commensurate with experience.
Requirements: Graduate from college with degree in engineering, preferably supplemented by graduate level courses in traffic engineering plus a minimum of two years experience in traffic engineering work with progressive responsibilities.
Apply: Ralph G. Lewis, City Traffic Engineer, Room 215 City Hall, Chattanooga 2, Tennessee.

CITY OF INDIANAPOLIS, IND.

Position: Traffic Field Engineer.
Requirements: Civil engineering graduate with Indiana registration or qualifications for Indiana registration. Preferman with two years of traffic engineering experience. Must have ability to meet the public, supervise field personnel, and prepare technical reports.
Salary: $600 to $675 per month, depending upon experience.
Apply: Stanley T. Siegel, Director, Bureau of Traffic Engineering, Room 7 City Hall, Indianapolis 4, Indiana.

STATE OF OHIO DEPARTMENT OF HIGHWAYS

Positions: Field Engineers (Traffic) to supervise, assist and coordinate the work of Division Traffic Engineers in comprehensive traffic engineering activities and to provide liaison between field operations and the central office of the Bureau of Traffic.
Requirements: Graduate civil engineer with a minimum of five years experience on diversified traffic engineering and planning projects including supervisory duties. Professional registration required or ability to become registered in the State of Ohio.
Salary: $785-$940.

———o———

Positions: Division Traffic Engineers to assume responsible charge of all phases of traffic engineering within the field Divisions of the Department of Highways. Duties will consist of administering, as a member of the Division Engineers staff:
1) Administrative policies of the Division.
2) State-wide policies and procedures established by the Director of Highways and the Bureau of Traffic and
3) the utilization of established traffic engineering techniques.

Requirements: Graduate civil engineer with education and experience in traffic engineering. Professional registration required or ability to become registered in the State of Ohio.
Salary: $720-$860.
Benefits: Liberal Public Employees Retirement Program, paid vacation, sick leave and other fringe benefits.
Apply: Forward resumé of experience and training to James V. Musick, Engineer of Traffic, Ohio Department of Highways, 450 East Town Street, Columbus 15, Ohio.

CITY OF SAN BERNARDINO CALIFORNIA

Position: Traffic Engineer.
Requirements: Graduation in civil or traffic engineering, with two years of experience in traffic engineering, or a combination of such education and experience.
Salary: $618 to $714 per month. Qualified persons may start at $677 per month.
Apply: Civil Service Board, Room 110 City Hall, 426 Third Street, San Bernardino, California.

SPRINGFIELD, MISSOURI

Position: Traffic Engineer
Requirements: Civil Engineering Graduate supplemented by specialized training in traffic engineering. One or more year's experience preferred.
Salary: $536-$718 per month.
Apply: Personnel Department, City Hall, Springfieldfi, Missouri.

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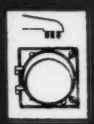
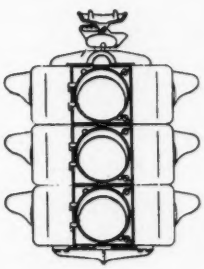
ADJUSTABILITY THROUGH TRI-STUD MOUNTINGS BETWEEN SECTIONS

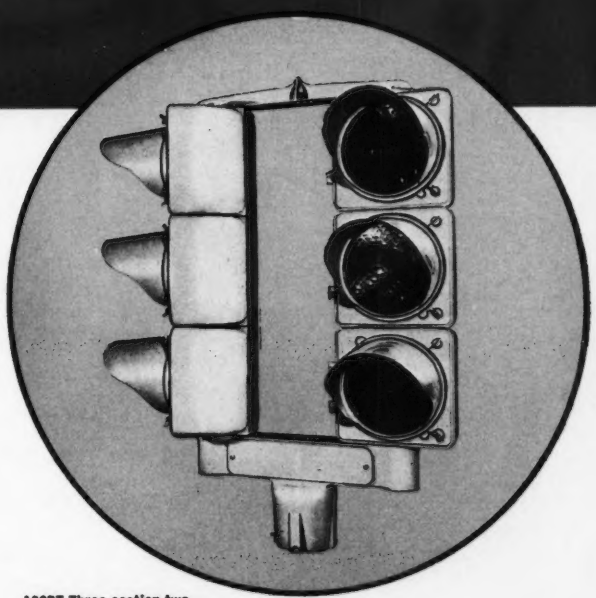
AND ON BRACKET MOUNTINGS FOR SIGNALS 

This is because tri-stud mountings do not require serrations to hold each section firmly in place and can therefore be directionally adjusted to an infinite degree.

A31PM One way three section 4" post mounting



A33SW Three section three way span wire mounting



A32PT Three section two way post mount with terminal box

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RAMP DESIGN

(Continued from page 16)

tween the entrance ramp elements and the main freeway lanes.

While this paper has dealt only with freeway entrance ramps, the concept of considering traffic behavior and driver requirements is applicable to all elements of freeway design. It is essential that freeway operational research be continued and that the results of such research be incorporated into the design of future freeway facilities.

Acknowledgement

The research work discussed in this paper was performed under the sponsorship of the Texas Highway Department. Gratitude is expressed to this organization for their cooperation and permission to use research data in the development of this paper. Thanks are due also to Mr. C. J. "Jack" Keese, Head of Design and Traffic Section, Texas Transportation Institute for his encouragement in this endeavor.

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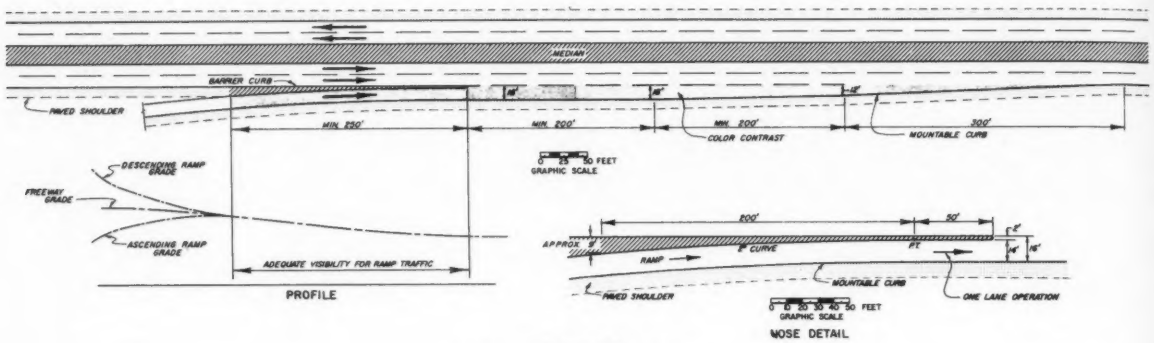

Figure 18
Desirable Entrance Ramp Design

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Coming Events

January 9-13, 1961 — HIGHWAY RESEARCH BOARD—
Annual Meeting, Sheraton-Park Hotel, Washington, D. C. Contact: HRB, 2101 Constitution Avenue, Washington 25, D.C.

March 5-7—SOUTHERN SAFETY CONFERENCE—
Annual Conference and Exposition, Atlanta Biltmore Hotel, Atlanta, Georgia. Contact: W. L. Groth, P. O. Box 8927, Richmond 25, Va.

March 6-24—TRAFFIC ENGINEERING SEMINAR—
Three-week course sponsored by Midwest Section, ITE and Northwestern University. Tuition $195. Contact: The Traffic Institute, 1804 Hinman Ave., Evanston, Ill.

March 28-30—WESTERN SAFETY CONGRESS—
8th Annual Congress & Exhibits, Ambassador Hotel, Los Angeles, Calif. Contact: Greater L. A. Chapter NSC, 3388 W. 8th St., Los Angeles 5, Calif.

August 21-26, 1961—WORLD TRAFFIC ENGINEERING CONFERENCE—
31st Annual Meeting, Institute of Traffic Engineers and 6th International Study Week in Traffic Engineering, Sheraton-Park Hotel, Washington, D. C. Contact: ITE, 2029 K St. N.W., Washington 6, D. C.

ACCIDENT REPORTING

(Continued from page 30)

by police officials. One police chief states that their use has been very helpful in determining the cause of many of the collisions that have occurred on the freeway.

Finally, comparing reports of several hundred accidents made on the special freeway forms during the past year with reports on the standard forms made for several preceding years, considerable improvement in clearness and precision of location is noted. Far more of the accidents can be clearly located from the graphic description given on the special freeway forms. Ordinarily, of course, in plotting collision data onto a strip map, both the textual standard form and the special freeway form would be available together. Trial use of the special forms by one city more than doubled the efficiency and satisfactory description as compared with the use of standard forms by the same city. Another city increased by 33% in satisfactory description by means of the suggested forms. Continuous use of such forms should bring greater familiarity and even more pronounced improvement in reporting.

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MEMBERSHIP APPLICATIONS

The Institute of Traffic Engineers welcomes applications from qualified traffic engineers, but does not desire as members persons who are unqualified. Listed below are the names of those from whom applications for membership or transfer in grade have been received since the last published list. Institute members are urged to review this as soon as possible and immediately inform the Executive Secretary's office if names of people are found who are known to be unqualified for ITE membership or transfer.

New Applications

ANDERSON, Edwin Rudolph
Captain—Traffic Engineer, City of Fargo, City Hall, Civic Center, Fargo, North Dakota—for ASSOCIATE.

AUDIFFEREN, Solomon Bankole
Senior Executive Engineer, Highways—Federal Government of Nigeria, Federal Ministry of Works and Surveys, HQ, Lagos, Nigeria—for ASSOCIATE.

BEWICK, Robert Dixon, Jr.
Planning Engineer—Delaware State Highway Department, 152 S. State Street, Dover, Delaware—for ASSOCIATE.

BRAFFORD, Donald Martin
Traffic Engineer—City of Wheeling, City-County Building, 16th & Chapline Street, Wheeling, West Virginia—for JUNIOR.

DAVIS, Charles Robert
Chief Supervisor—Texas Highway Department, Planning Survey Division, Traffic Section, P. O. Box 5051, West Austin Station, Austin 31, Texas—for ASSOCIATE.

FUJIMORI, Kenichi
Chief, Highway Planning Department—Japan Highway Public Corporation, No. 1, 1-chome, Shiba Tamura-cho, Minato-ku, Tokyo, Japan—for MEMBER.

JIVATODE, George Ramkrishna
Traffic Engineer—D. C. Department of Highways and Traffic, District Building, Washington 4, D. C.—for JUNIOR.

LAPP, David Lawrence
Traffic Engineer—D.C. Department of Highways and Traffic, District Building, Washington 4, D. C.—for JUNIOR.

MIDGETTE, Richard Insley
Assistant Civil Engineer—New York State Traffic Commission, 95 Washington Avenue, Albany, New York—for JUNIOR.

OLSHESKY, John James
Division Engineer of Survey & Plans—Connecticut Highway Department, P. O. Box 3090, New Haven 15, Connecticut—for ASSOCIATE.

RAINUSSO, Ivonne
Engineer in charge of Traffic Section—State Highway Department, Avenida Uruguay 1120, Montevideo, Uruguay—for JUNIOR.

ROYER, Joseph Paul, Jr.
District Traffic Engineer—Virginia Department of Highways, Box 671, Culpeper, Virginia—for JUNIOR.

WARNBERG, Donald Raymond
Associate Engineer, Supervisor of Traffic Regulations & Control Unit—Colorado Department of Highways, 4201 East Arkansas Avenue, Denver, Colorado—for ASSOCIATE.

WHITE, Jerry Lee
Office Engineer—Kentucky Highway Department, Frankfort, Kentucky—for JUNIOR.

Applications for Transfer

CARROW, William Reynolds
Traffic Engineer—Delaware State Highway Department, No. 11 East North Street, Dover, Delaware—for MEMBER.

CRAWFORD, George LeRoy, Jr.
Traffic Field Engineer—Illinois Division of Highways, 9300 St. Clair Avenue, East St. Louis, Illinois—for ASSOCIATE.

HILLER, Sherwood H.
Traffic Engineer—City of Tampa, 316½ Franklin Street, Tampa, Florida—for MEMBER.

MAY, John Franklin
Assistant to Traffic Engineer—Illinois Division of Highways, Bureau of Traffic, 801 State Office Building, Springfield, Illinois—for ASSOCIATE.

NIELSEN, Mogens Thor Madsen
Director, Traffic Engineering Services Department—City of Ottawa, 111 Sussex Drive, City Hall, Ottawa, Ontario, Canada—for ASSOCIATE.

RICH, Marshall Miller
Associate Traffic Engineer—Wilbur Smith & Associates, Box 7354, Reynolda Station, Winston-Salem, North Carolina—for MEMBER

SCHEMPERS, William, Jr.
Traffic Engineer—Automobile Club of Southern California, 2601 South Figueroa Street, Los Angeles 54, California—for ASSOCIATE.

SHOCKEY, Jack Whitson
District Manager—Elizabeth Division of Elastic Stop Nut Corporation of America, 6742 West Fifth Place, Denver, Colorado—for ASSOCIATE.

WATSON, Frank Llewellyn
Senior Traffic Engineer—Traffic & Transportation Department, 702 City Hall, Houston, Texas—for ASSOCIATE.

YEARBOOK CHANGES

BAULE, Charles L. (Junior)
Civil Engineer, LaCrosse Dredging Corp., 140 South Dearborn Street, Chicago 3, Illinois. SEND MAIL: 1524 West Pratt Blvd., Chicago 26, Illinois.

BLOMME, George W. (Junior)
Transportation Planner, Planning Division, Port of New York Authority, 111 Eighth Avenue, New York 11, New York. ALgonquin 5-1000.

BOARDMAN, William F. (Associate)
Acting Technical Director, Regional Highway Planning Committee, D. C. Dept. of Highways & Traffic, 499 Pennsylvania Avenue, Washington 1, D. C. NAtional 8-6000, ext. 2859. SEND MAIL: 5704 Ogden Road, Washington 16, D. C.

CHANN, Irving K. (Associate)
Associate Engineer, Wilbur Smith & Associates, 495 Orange Street, New Haven, Connecticut. UNiversity 5-2191. SEND MAIL: 77 Franklin Road, Hamden, Connecticut.

CLAFFEY, Paul J. (Associate)
Associate Professor, Civil Engineering, Catholic University of America, 625 Michigan Avenue, N.E. Washington 17, D. C. ADams 2-6000, ext. 263. SEND MAIL: 3809 13th St., N.E. Washington 17, D. C.

HALE, Peter P. (Associate)
Vice President, Technical Planning Associates, 282 York Street, New Haven 11, Connecticut. LOcust 2-0642.

HOLMES, Robert S. (Member)
Manager, Highway Construction Marketing, U. S. Steel Corp., 525 William Penn Place, Pittsburgh 30, Pennsylvania. EXpress 1-2345, ext. 4349.

HOMBURGER, Wolfgang S. (Junior)
Assistant Research Engineer, Institute of Transportation & Traffic Engineerirg, University of California, 1301 S. 46th Street, Richmond, California. LAndscape 5-4990, ext. 207. SEND MAIL: 280 Columbia Avenue, Berkeley 8, California.

HUBBARD, Robert A. (Junior)
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HYMANS, Edgar M. (Affiliate)
Director of Research, The Cincinnati Transit Company, 300 Transit Building, Cincinnati 3, Ohio.

McCRACKEN, Dwight M. (Member)
Vice President, General Manager Loss Prevention, Liberty Mutual Insurance Company, 175 Berkeley Street, Boston 17, Massachusetts. LIberty 2-4850, ext. 141.

McREYNOLDS, Marshall B. (Associate)
President, Traffic Engineers Supply Corp., 808-12 N. Fairfax Street, Alexandria, Virginia. KIng 8-5858.

PETERSEN, Stephen G. (Junior)
Staff Engineer, Institute of Traffic Engineers, 2029 K Street, N.W., Washington 6, D. C. FEderal 7-1240. SEND MAIL: 8327 Donoghue Drive, Carrollton, Hyattsville, Maryland.

SHERIDAN, Robert E. (Junior)
Traffic Engineer, Traffic Control Division, Electronic Industries Imports Pty. Ltd., 139-143 Bouverie Street, Carlton. N. 3. Melbourne, Victoria, Australia. F. J. 4161 (Melbourne)

By Joseph Tremblay

"On second thought, Harry, let's just ignore the prints and not remove this church sign."

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W Sherman Smith

W Sherman Smith, (Associate Member, ITE) died November 2 in Toledo, Ohio. A former Dean of Engineering at the University of Toledo, he had been a member of the Institute of Traffic Engineers since 1934.

Dean Smith was a native of Toledo, and received his undergraduate engineering training at Purdue, with a B. S. in C. E. He later received an M. S. from the University of Toledo, and the degree of C. E. from the University of Michigan.

The major part of Dean Smith's professional career was spent in the teaching field, most of it at the University of Toledo. His interests were closely related to safety, and he worked on traffic accident analysis problems on several different occasions, chiefly in connection with the Michigan State Police.

Section News

FLORIDA SECTION

A Traffic Engineering Conference, sponsored jointly by the Florida Section and the General Extension Division of Florida, was held at Gainesville, October 2-5, 1960. A total of 47 persons registered for the 2½ day program which covered traffic operations, freeways, and parking. Fourteen cities, two states, and five consulting or other organizations were represented. Seven of the participants were enforcement officials. The consensus seemed to be that everyone who attended gained some good new information and profited also through association with other people in traffic work in Florida. Proceedings are being published by the Section and can be provided upon request.

The Quarterly Section Business Meeting was held on October 4 during the Conference, with 44 members and guests attending. An address was made by Dave Baldwin on the subject, "Traffic Engineering as a Profession." Special guest Gene Barton also made remarks on the history of ITE and the profession and in recognition of the traffic products industry.

Nominees for 1961 Section officers are: for President, George H. Kunde; for Vice-President, John W. Barr; for Secretary-Treasurer, Henry P. Boggs; for Director, Sherwood H. Hiller.

Participants in the first Traffic Engineering Conference held at the University of Florida in Gainesville under the co-sponsorship of the Florida Section, ITE, October 3-5, 1960.

Speakers at the Florida TE Conference: seated, l. to r., Arthur West, Florida State Road Department; Sherwood Hiller, Tampa; Capt. C. E. Taylor, Florida Highway Patrol; David M. Baldwin, ITE Executive Secretary; standing, l. to r., Harry Stark, U. S. Bureau of Public Roads, Atlanta; Adrian Koert, Insurance Institute for Highway Safety; John W. Barr, Metropolitan Dade County; George H. Kunde, Metropolitan Dade County; and Robert A. Burch, North Carolina State Highway Commission.

It was announced by Section President Ed Mueller that a pilot short course series for signal technicians would be presented January through May, 1961. This course is being co-sponsored by the Section and the Signal Employees Association. It was further announced that a new Committee has been created to handle matters related to traffic control devices, the new Uniform Manual, and uniformity.

The Annual Section Meeting was held in Miami, December 2 and 3. The program included panel discussions, technical papers, a field trip, entertainment, and a Banquet and installation of officers.

WASHINGTON (DC) SECTION

The January meeting of the Section, traditionally held during the week of the Highway Research Board meeting and attended by many ITE members and friends in Washington for the HRB meeting, is scheduled as follows:

Date: Tuesday, January 10, 1961.

Time: 6 p.m.—Social hour.
7 p.m.—Dinner.

Place: To be announced. Tickets available at Sheraton-Park Hotel on Sunday and Monday, Jan. 8 & 9.

Speaker: Ellis Armstrong, Commissioner of Public Roads.

NORTHWESTERN STUDENT CHAPTER

The Northwestern University Student Chapter for 1960-61 has been organized, with twenty members. Professor Donald S. Berry will serve as advisor. Officers of the Chapter are: Gilbert T. Satterly, Jr., president; Claudio Podesta, vice president; Jose M. Zuniga, treasurer; and Joseph A. Wattlesworth, secretary.

Publications List

The publications of the Institute of Traffic Engineers listed below are available from the headquarters office at 2029 K Street N.W., Washington, D.C.

TRAFFIC ENGINEERING Magazine

TRAFFIC ENGINEERING is the official monthly publication of the Institute. It contains original articles of a technical and semi-technical character dealing with traffic engineering and related subjects. It also contains digests of current traffic news of unusual interest, and personal news of members.

Subscriptions ..... $4.50 a year
Foreign Postage ..... $1.25 a year, all countries except U.S. possessions, Canada and Mexico.
Single Copies ... $0.50 each, quantities of 1 to 9.
$0.40 each, quantities of 10 or more.

PROCEEDINGS

The Annual Proceedings of the Institute contain copies of all papers presented at the Annual Meeting.

1959 Edition	$2.00	1952 Edition..	out of print
1958 Edition	1.50	1951 Edition	$0.50
1957 Edition..	out of print	1950 Edition..	out of print
1956 Edition..	out of print	1949 Edition..	out of print
1955 Edition	0.75	1948 Edition	0.50
1954 Edition	0.75	1947 Edition	0.50
1953 Edition	0.75	1946 Edition	0.50

Set of 46, 47, 48, 51, 53, 54, 55, 58 and 59 editions—$5.00 per set.

YEARBOOK

The annual yearbook (published in February) of the Institute of Traffic Engineers, containing a brief description of the organization, copies of the Constitution and By-Laws, and a list of the members with mailing addresses. Price $1.00 per copy.

TECHNICAL BULLETIN #1

"Adjustable Face Traffic Control Signal Head Standards."

This bulletin has been approved (October 16, 1958) as an American Standard by the American Standards Association. Price $0.50 per copy.

SUPPLEMENT TO TECHNICAL BULLETIN #1

"12-Inch Adjustable Face Traffic Control Signal Head Standards."

This supplement to Technical Bulletin #1 was approved by the Institute in January 1960. Price $0.15 per copy.

TECHNICAL BULLETIN #2

"Pre-Timed, Fixed Cycle, Traffic Signal Controllers."

This bulletin has been approved (October 16, 1958) as an American Standard by the American Standards Association. Price $0.50 per copy.

TECHNICAL BULLETIN #3

"Traffic-Actuated, Traffic Signal Controllers and Detectors"

This bulletin has been approved (October 16, 1958) as an American Standard by the American Standards Association. Price $0.50 per copy.

TECHNICAL BULLETIN #4

"A Model Performance Specification for Purchase of Pavement Marking Paint."

This bulletin was approved by the Institute in January 1960. Price $0.50 per copy.

PROPER LOCATION FOR BUS STOPS

This Technical Committee report of 1954 approved as a recommended practice has been printed as a 12-page pamphlet. Price $0.25 per copy.

INDUSTRIAL PLANT PARKING

A report of Technical Committee 6-F, approved in 1959 as a recommended practice of the Institute and reprinted from TRAFFIC ENGINEERING magazine. 8 pp. Price $0.15 per copy.

AUTO—USA

This pamphlet, issued as a companion piece for the film by the same name, is designed to acquaint citizens in any community with the basic requirements for carrying out a program of transportation improvement. Written in non-technical language, it is available apart from the film. Free.

RESEARCH TO IMPROVE TOMORROW'S TRAFFIC

A reprint of the 1957 Theodore M. Matson Memorial Award paper by O. K. Normann, Deputy Assistant Commissioner for Research, U. S. Bureau of Public Roads. 16 pp. Free.

TRAFFIC ENGINEERING IN TOMORROW'S TRANSPORTATION

A reprint of the 1958 Theodore M. Matson Memorial Award paper by D. Grant Mickle, Director, Traffic Engineering Division, Automotive Safety Foundation. 8 pp. Free.

HIGHWAY SAFETY—A PRIMARY CHALLENGE TO TRAFFIC ENGINEERING

A reprint of the 1959 Theodore M. Matson Award paper by Charles W. Prisk, Director, Highway Safety Study, U. S. Bureau of Public Roads. 4 pp. Free.

NOTE: *Traffic Engineering* and the current *Proceedings* are sent automatically to all ITE members as part of their membership service. Single copies of technical bulletins and reprints listed above are available upon request, without charge, to all ITE members.

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MID ATLANTIC SECTION

Excerpts from minutes

President Keeley presented a resolution which will provide for the establishment of a fund to be known as the Technical Fund. This fund is to be used for increasing the Section's technical activities and to promote the professional advancement and participation of its members. The resolution, as set forth in these minutes, was unanimously adopted. A motion by Richard Overmyer, seconded by Jack V. Miller, Jr., was carried, authorizing the Secretary-Treasurer, H. C. Gafvert, to transfer $366.41 to the Technical Fund, leaving the balance of $300.00 in the General Fund. New funds will be credited to the General Fund, with subsequent transfers made to the Technical Fund upon approval of the Executive Committee.

Resolution presented by President Keeley and unanimously adopted is as follows:

RESOLUTION

Whereas, the dues structure of the Mid-Atlantic Section is sufficient to provide funds over and above those required for the normal operation of the Section, and WHEREAS the Section is desirous of increasing its technical activities, and to promote the professional advancement and participation of its members.

THEREFORE BE IT RESOLVED that the Executive Committee is hereby authorized to set up a special fund in the manner hereinafter provided, to be expended as hereinafter set forth:

1) A special fund, to be known as the Technical Fund, shall be set up by the Secretary-Treasurer, to which shall be transferred, by Executive Committee action and approval all monies not specifically required for the normal operation of the Section.

2) From time to time, as may be necessary, the Executive Committee may transfer monies from the General Fund to the Technical Fund, or vice versa, if required, retaining sufficient balance in the General Fund at all times to provide for proper section operation and activity. Such transfers shall be authorized only by majority action at regularly called meetings of the Executive Committee on motions duly made, seconded and carried.

3) The Secretary-Treasurer shall account separately for the monies at regular meetings of the Executive Com-

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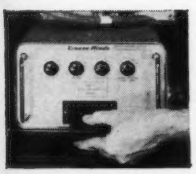

ONE OR MORE PLUG-IN ACCESSORIES expand functions of basic controller, without change in main timer, or addition of relays. Front of each unit has disconnect plug for easy removal.

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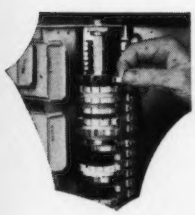
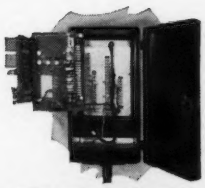
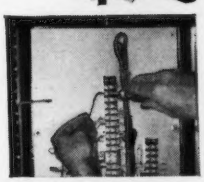


CAMSHAFT CONSTRUCTION reduces number of relays to *minimum* . . . permits a wider range of modifications before resorting to special accessories . . . without changes in timer or wiring.



"OPEN BOOK" CONSTRUCTION of Crouse-Hinds Controllers gives ready accessibility for all maintenance, installation and adjustment procedures.



ONE BASIC TIMER with one standard set of wiring handles all jobs. All modifications not made by simple cam adjustment are obtained by plug-in accessories without complicated rewiring.

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mittee and in the annual financial report to the Section.

4) The Technical Fund shall be expended for the following purposes:

a) Funds to be made available to a student at Yale Bureau of Highway Traffic from Mid-Atlantic Section area, for thesis work if approved as being of sufficient value and quality for participation and certified by faculty advisor.

b) Funds to be made available, on a loan basis only, to students at Yale Bureau of Highway Traffic from Mid-Atlantic Section area, to assist in putting him through, provided funds from other sources are not available. Such assistance shall be in the form of a non-interest bearing loan, covered by written agreement, wherein the method of repayment shall be specifically set forth.

c) Funds to be made available to Mid-Atlantic Section members for preparation or publication of report on original research, to the extent that no other funds are available, if research is deemed of sufficient value for participation.

d) Funds to be made available for any reasonable expenditures to enhance the value of technical programs on both the area and section level.

e) Funds to be made available for such other Section technical activity that may be considered meritorious by the Executive Committee.

5) To assist the Executive Committee in administering the Technical Fund, the Section Technical Committee shall receive and review all applications made for Technical Fund appropriation: shall investigate and recommend, by majority action of the Committee, in writing, the action it recommends be taken by the Executive Committee. The Executive Committee may approve or reject such Technical Committee recommendation, by appropriate action at any regularly called meeting of the Executive Committee, or by means of majority action of the Executive Committee on a letter ballot between scheduled meetings.

The approval of the Executive Committee as above set forth of a favorable recommendation made by the Technical Committee, shall constitute the necessary authority for the Secretary-Treasurer to make payment of Technical Funds for the approved project.

The Indiana Section in cooperation with the Fort Wayne, Indiana, Chamber of Commerce sponsored a city-wide luncheon on August 31 at which Indiana Section President James H. Cox (center) presented an ITE award to the city of Fort Wayne for maintaining a high level of performance in Traffic Engineering. Shown with Cox are James T. White, Traffic Engineer, (left) and Ivan Martin, Manager of Safety Council of the Fort Wayne Chamber of Commerce (right).

YALE STUDENT CHAPTER

The 1960-61 Yale Student Chapter has been formed, with 33 members and the following officers: Harry Skinner, president; Richard Ames, vice president; and Donald Sokol, secretary-treasurer. The advisor for the group is Matthew J. Huber, research associate of the Yale Bureau of Highway Traffic.

PURDUE STUDENT CHAPTER

The Purdue Student Chapter for 1960-61 has been organized at Lafayette, with 24 members. Officers for the chapter, elected at a meeting on October 19, are: Vergil G. Stover, president; Forrest D. Miller, vice president; and Alan F. Lohr, secretary-treasurer. Professor Harold L. Michael is faculty advisor.

(Continued on page 66)

Yale Student Chapter

Row 1—Davia, Granberg, Ryan, Hultman, Goulet, Chan, Machlin; Row 2—Tone, MacMonigle, Watts, Kassan, Graham, Donovan; Row 3—Foxworth, McCarthy, McMillen, Ames, Sokol, Rubenstein; Row 4—Sweet, Boutwell, Deaton, Lathrop, Robertson; Row 5—Howard, Skinner, Lipps, Tracy, Samuelson; Row 6—Pearson, Pugh, Royer, Sessoms.

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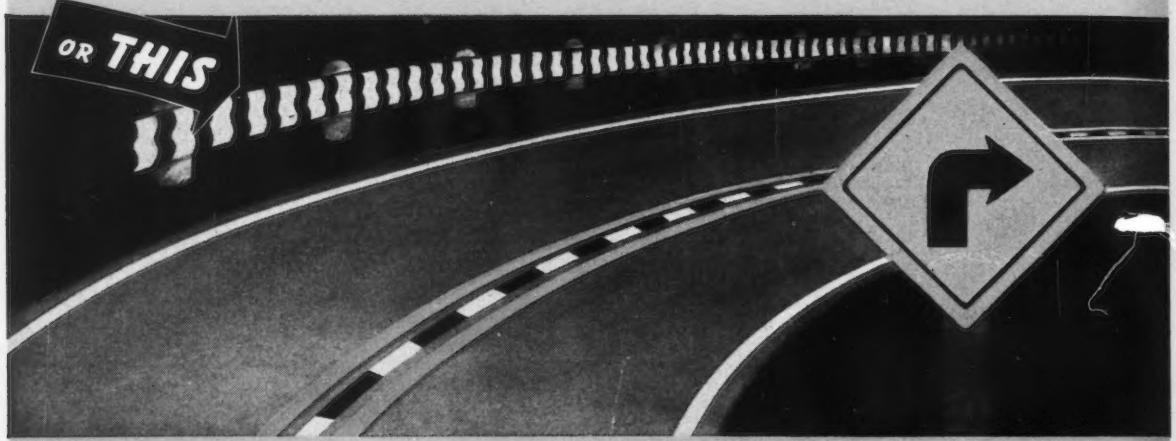

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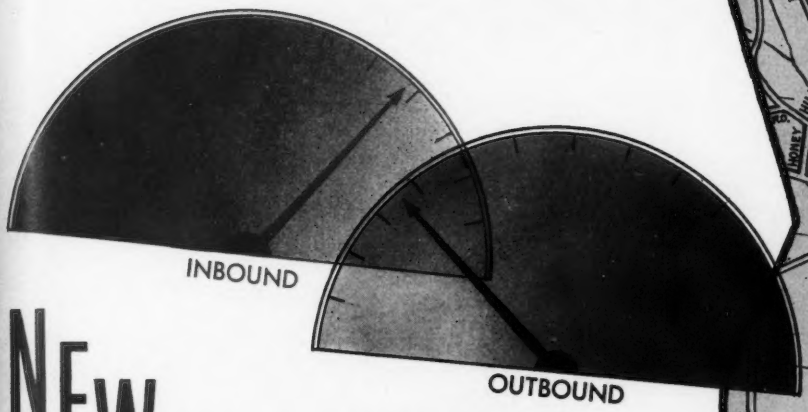

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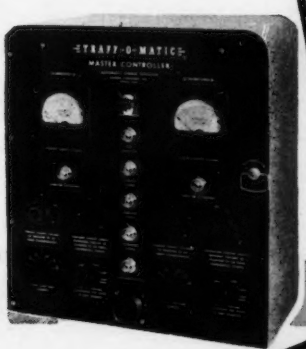

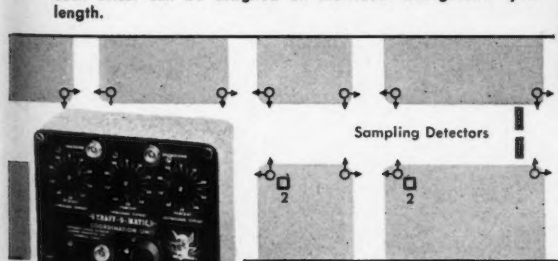

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SECTION NEWS

(Continued from page 62)

ILLINOIS STUDENT CHAPTER

The Illinois Student Chapter has been organized for the current school year with six members. Officers are: Arthur T. Horkay, president; Jack Marcellis, vice president; and Robert R. Harms, secretary-treasurer.

METROPOLITAN (NY) SECTION

The January meeting of the Section is scheduled as follows:

Date: Tuesday, January 10, 1961.

Time: 6-7 P.M.—Business Meeting.
7:30—Dinner and meeting.

Place: Edgebrook Restaurant, U.S. Rt. 1 and N. J. Rt. 18, New Brunswick, New Jersey.

Cost: Approximately $3.25 (Chicken Dinner).

Speaker: D. Louis Tonti, Executive Director, New Jersey Highway Authority.

Topic: "The Role of Toll Road Facilities in the Interstate System."

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